APPLICABLE TO INSTRUMENTS
WITH SERIAL NUMBER 141
AND ABOVE

MODEL CE-71
SPECTRUM DISPLAY

MAINTENANCE MANUAL

CUSHMAN
ELECTRONICS, INC.

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TABLE OF CONTENTS

		page
SECTION 1	THEORY OF OPERATION	
	Introduction	1-1
	Circuit Reference Series	1-1
	Functional Description	1-1
	Circuit Description	1-6
	Master Phase Lock Loop, 2300	1-6
	Slave Phase Lock Loop, 2500	1-6
	Marker and Variable Oscillator, 2400	1-7
	Sweep Generator and High Level Alarm, 2700	1-8
	Switch Logic, 2100	1-9
	RF Switch, 2800	1-9
	80 kHz Band Pass Filter, 2600	1-9
	Logarithmic Amplifier, 2200	1-10
	Low Voltage Power Supply, 2900	1-11
SECTION 2	MAINTENANCE	
	General	2-1
	Performance Checks	2-1
	Equipment Required	2-1
	Adjustment and Calibration	2-5
	Equipment Required	2-5
	Repair Service	2-7
	Preparation for Reshipment	2-8
	Troubleshooting	2-8
SECTION 3	PARTS LISTS AND SCHEMATIC DIAGRAMS	
	Introduction	3-1

TABLES

Table No.		
1-1	Model CE-71 Specifications	1-3
2-1	Troubleshooting Chart	2-9
3-1	Printed Circuit Board and Circuit Reference Numbers Cross Reference	3-1

ILLUSTRATIONS

Figure No.		page
1-1	Model CE-71 Spectrum Display	1-2
1-2	Model CE-71 Overall Block Diagram	1-13
2-1	Combined Instruments Rear Panel Connections	2-2
3-1	Front Panel Interconnection Diagram, Switch Mounting, 1000/1100	3-5
3-2	Main Chassis Interconnection Diagram, 2000, sheet 1	3-9
3-3	Main Chassis Interconnection Diagram, 2000, sheet 2	3-11
3-4	Main Chassis Interconnection Diagram, 2000, sheet 3	3-13
3-5	Switch Logic, 2100	3-17
3-6	Logarithmic Amplifier, 2200	3-23
3-7	Master Phase Lock Loop, 2300	3-31
3-8	Marker and Variable Oscillator, 2400, sheet 1	3-39
3-9	Marker and Variable Oscillator, 2400, sheet 2	3-41
3-10	Slave Phase Lock Loop, 2500	3-49
3-11	80 kHz Band Pass Filter, 2600	3-55
3-12	Sweep Generator, 2700	3-61
3-13	R. F. Switch, 2800	3-69
3-14	Low Voltage Power Supply, 2900	3-73
3-15	High Voltage Power Supply/Deflection Amplifier, 3000, sheet 1	3-81
3-16	High Voltage Power Supply/Deflection Amplifier, 3000, sheet 2	3-83
3-17	Rear Panel Interconnection Diagram, 4000	3-87

SECTION 1
THEORY OF OPERATION

INTRODUCTION

1.01 In this section the Circuit Reference Series for circuit and component identification is explained, the overall functioning of the instrument is outlined and a description of the individual circuits is given. The instrument specifications are listed in Table 1-1.

CIRCUIT REFERENCE SERIES

1.02 The circuits of the CE-71 are referred to by the series 1000/1100, 2000-3000 and 4000. 1000 is the Front Panel, 1100 is the Switch Mounting. 2000 is the Main Chassis and 2100-2900 are circuits that plug into the Main Chassis. 3000 is the High Voltage Power Supply and Deflection Amplifier and 4000 is the Rear Panel.

1.03 Each type of component in a circuit is individually numbered with a letter designating the type of component and a number in serial order. The complete identification for any component includes the circuit reference number. Thus, the first resistor in the Logarithmic Amplifier is R2201, the third transistor is Q2203, etc. When individual circuits are described in the Circuit Description section the component reference will be shortened to the circuit component number, as R1, Q3, etc., with the exception that when reference is made to a component in another circuit the full Circuit Reference Series number will be used.

1.04 Table 3-1 is a cross reference list of the PC Board numbers, the Assembly numbers and the Circuit Reference Series numbers. Figure and page number of the circuit drawings are also given. In this table the circuits may be identified by the PC Board number etched on each board and cross referenced to the Circuit Reference Series and the Assembly number. Each of these numbers also appears in the parts list for these circuits.

FUNCTIONAL DESCRIPTION

1.05 The purpose of the CE-71 is to display the amplitude and relative frequency relationship of individual signals or groups of signals being measured by the CE-70 Frequency Selective Levelmeter. The CE-71 may also be used with the CE-70 and CE-72 to provide a complete Transmission Test System for the analysis and troubleshooting of FDM carrier communications systems.

1.06 The display is made on a Cathode Ray Tube. The screen graticule of the CRT is calibrated vertically in dB and horizontally in frequency. Signals, or signals that are missing from a group, thus may be identified and the amplitude and frequency of those signals present may be determined.

1.07 The Local Oscillator (LO) frequency (50.7-75.7 MHz) from the CE-70 is brought into the CE-71 through connector "A" to the RF Switch, 2800. Refer to Overall Block Diagram, Figure 1-2. From the RF Switch it goes to the Marker/Variable Oscillator, 2400, where the LO frequency also is used to generate a marker to indicate on the CE-71 CRT the frequency to which the CE-70 is set. A frequency-to-voltage converter generates a steering voltage that is used in both Master and Slave Phase Lock Loops to keep the frequency aligned with the CE-70 to within the phase lock pull-in range.

1.08 The LO frequency from the CE-70 (50.7-75.7 MHz) also goes from the RF Switch, 2800, to the Master Phase Lock Loop, 2300. Here, in the phase locked mode, a frequency of 51.2-76.2 MHz is generated by a Voltage Controlled Oscillator (VCO), phase locked to the CE-70 LO. A 500 kHz reference frequency fed into the loop from the Log Amplifier board, 2200, is used to produce the 500 kHz offset from the CE-70 LO frequency.

1.09 The 51.2-76.2 MHz output from the Master Phase Lock Loop, 2300, goes to the Slave Phase Lock Loop, 2500, where it is used to phase lock a VCO generated frequency of 50.7-75.7 MHz. Also fed into this loop, in the phase lock mode, is the output of a 500 kHz LC or RC oscillator swept over a range of ± 2 kHz, ± 30 kHz or ± 150 kHz (.4, 6, 30 kHz/DIV) bandwidths. This provides a 50.7-75.7 MHz LO swept over the proper bandwidth as determined by the setting of the kHz/DIV switch. In the 300 and 1000 kHz/DIV mode phase lock is not used. Instead the VCO is swept by the ramp voltage from the Sweep Generator, 2700, and the center of the swept frequency is aligned with the CE-70 frequency by the steering voltage from the frequency-to-voltage converter. In the 2500 kHz/DIV mode the steering voltage is not used, but the VCO is swept from 50.7-75.7 MHz by the sweep ramp. The output of the Slave Phase Lock Loop goes to the 2800 board where it is buffered and switched to both the CE-70 ("E") and the CE-72 ("F").

1.10 In the CE-70 the swept LO from the CE-71 to the first mixer (in place of the locally generated LO) sequentially converts the signals in the swept band to the IF of the CE-70. They are then amplified, converted to the third IF (80 kHz) and brought back to the CE-71, through connector "D", to the 80 kHz Band Pass Filter, 2600. There the signals pass through the appropriate filter, according to the bandwidth selected, to the Logarithmic Amplifier, 2200. Here they are converted from a linear to a logarithmic amplitude response, and the IF envelope detected. This output is amplified in the Deflection Amplifier, 3000. The output of this circuit is the vertical deflection signal to

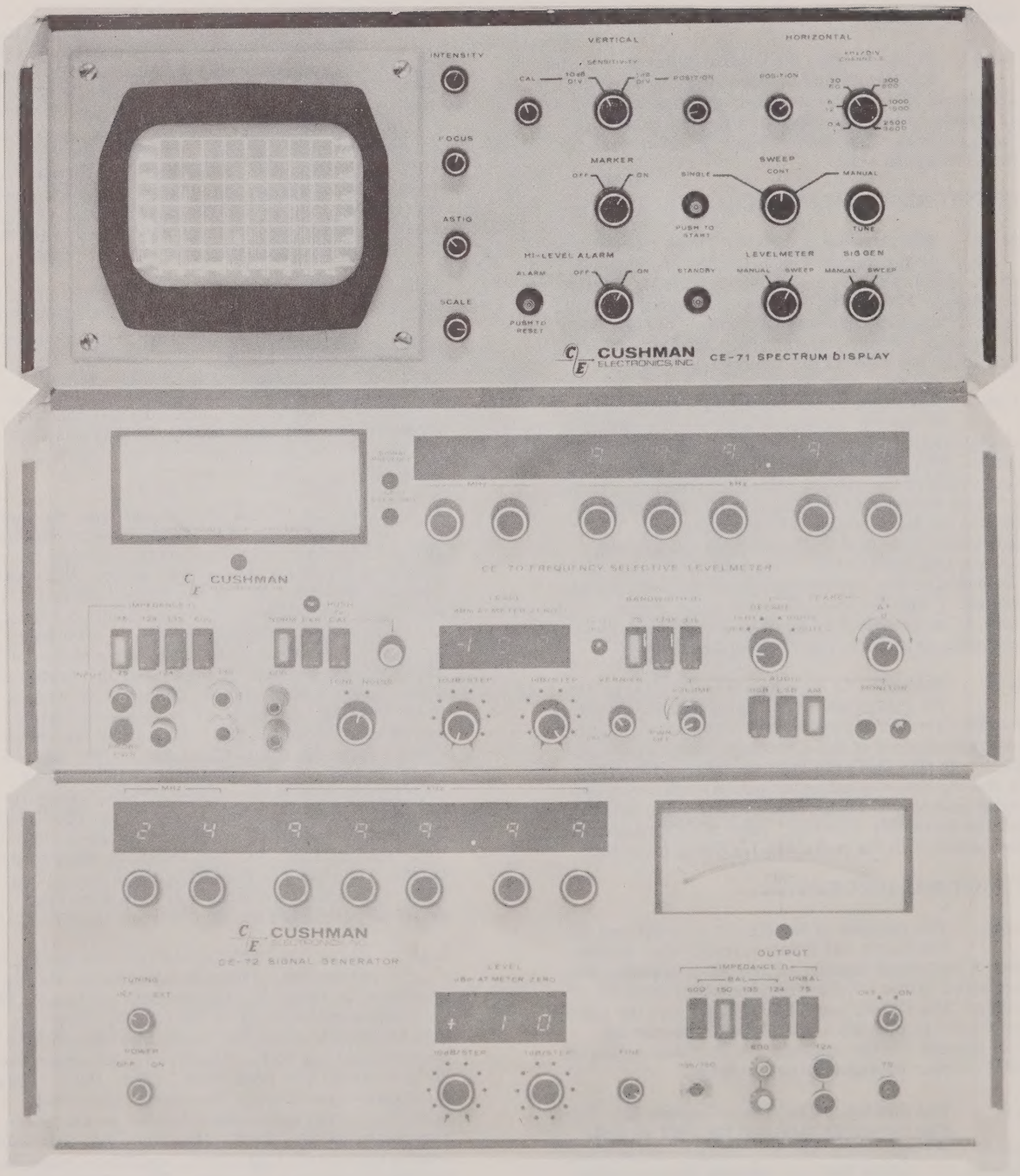


Figure 1-1. Model CE-71 Spectrum Display

Table 1-1. CE-71 Specifications

ITEM	CHARACTERISTICS
FREQUENCY	
Range	1 kHz to 25 MHz
Sweep widths (Fixed, switch selected)	25 MHz, 10 MHz, 3 MHz, 300 kHz, 60 kHz, 4 kHz
Marker Accuracy	± 2% of full scale
Resolution	0 dB / 20 dB / 50 dB
25 MHz	250 kHz / 350 kHz / 500 kHz
10 MHz	100 kHz / 150 kHz / 200 kHz
3 MHz	30 kHz / 40 kHz / 50 kHz
300 kHz	5 kHz / 10 kHz / 15 kHz
60 kHz	1 kHz / 2 kHz / 4 kHz
4 kHz	100 Hz / 200 Hz / 500 Hz
LEVEL	
Range	
Input (for 0 dB level on display)	-109 dBm to +10 dBm
Display (ref. to 0 dB reading on CE-70)	60 dB logarithmic, +40 dB to -20 dB
Accuracy (at -40 dB, after CAL to CE-70 in sweep mode in which measurement is to be made)	Same as CE-70
Frequency Response	± 0.1 dB additional to CE-70 specifications
Display Linearity (Vertical Deflection)	
10 dB/DIV mode	± 2 dB
1 dB/DIV mode	± 0.5 dB
INTERNAL DISTORTION	See CE-70 specifications
SPURIOUS RESPONSES (Referred to 0 dB on display)	
CE-70 Tone mode	
0 to 20 dB overdrive	<-15 dB
20 to 40 dB overdrive	<-10 dB
CE-70 Noise mode	
0 to 20 dB overdrive	<-8 dB
20 to 40 dB overdrive	<-5 dB
IF BANDWIDTH (Nominal)	
Sweep width	
25 MHz, 10 MHz, 3 MHz	
3 dB	5 kHz
60 dB	75 kHz
300 kHz	
3 dB	1.5 kHz
60 dB	15 kHz
60 kHz	
3 dB	400 Hz
60 dB	4 kHz
4 kHz	
3 dB	45 Hz
60 dB	450 Hz

Table 1-1. CE-71 Specifications (cont'd)

ITEM	CHARACTERISTICS
SWEEP RATE (Nominal)	
Sweep width	
25 MHz	0.4 Hz (2500 ms period)
10 MHz	1.0 Hz (1000 ms period)
3 MHz	2.2 Hz (450 ms period)
300 kHz	2.2 Hz (450 ms period)
60 kHz	2.2 Hz (450 ms period)
4 kHz	0.5 Hz (2000 ms period)
DISPLAY LINEARITY (Horizontal Deflection)	
Sweep width	25°C ± 5°C (% of full scale) / 0°C to +55°C (% of full scale)
25 MHz	± 3% / ± 4%
10 MHz	± 5% / ± 10%
3 MHz	± 5% / ± 10%
300 kHz	± 2% / ± 2%
60 kHz	± 2% / ± 2%
4 kHz	± 5% / ± 8%
LOCAL OSCILLATOR INPUTS/OUTPUTS	
A 50.7-75.7 MHz 1st LO input from CE-70	>-13 dBm
C 50.7-75.7 MHz 1st LO input from CE-70	>-13 dBm
E 50.7-75.7 MHz 1st LO output to CE-70	>-13 dBm
F 50.7-75.7 MHz 1st LO output to CE-72	>-13 dBm
CATHODE RAY TUBE	
Size	5 inch diameter
Phosphor	P7
Persistence	Long, after filtration, yellow component only
Graticule	6 cm x 10 cm
IF INPUT (Nominal)	
Impedance	600Ω
Center Frequency	80 kHz
Level, 0 dB Display	-50 dBm
REMOTE CONTROL MODE OF OPERATION	
Levelmeter Manual/Sweep	
Sweep	Ground on center conductor of IF input connector D
Manual	Open or +5V on center conductor D
Signal Generator Manual/Sweep	
Sweep	Ground on center conductor LO output connector F
Manual	Open or +5V on center conductor F
HI LEVEL ALARM OUTPUT (Rear panel banana jacks)	
Alarm Condition	Dry contacts, contact closed
Contact Rating	1A at 125V AC
HI LEVEL ALARM TRIGGER LEVEL	
Sweep widths 4 kHz to 10 MHz	
10 dB/DIV mode	+1.0 dB graticule ± 2.5 dB
1 dB/DIV mode	+0.1 dB graticule ± 1 dB

Table 1-1. CE-71 Specifications (cont'd)

ITEM	CHARACTERISTICS
POWER REQUIREMENTS	115/230V AC ± 10%, switchable 50-60 Hz, 70VA nominal
DIMENSIONS	7 3/4" (19.7 cm) H, 17 3/4" (45.1 cm) W, 22" (55.9 cm) D
WEIGHT	45 lbs.
ENVIRONMENTAL	
Temperature, Operating	0°C to +55°C
Storage	-40°C to +75°C

the CRT.

1.11 The sweep ramp for the swept oscillators and the horizontal sweep circuit of the CRT is generated in the Sweep Generator/Hi Level Alarm circuit, 2700. This sweep ramp may be set for continuous repetition, or for a single sweep triggered by a front panel push button, or in the MANUAL position it may be tuned back and forth across any portion of the sweep width by the front panel TUNE control.

1.12 The sweep ramp also sweeps the LC or RC oscillators in the Marker/Variable Oscillator circuit, 2400, or is routed to the 2500 circuit to sweep the Slave VCO. In each case the center of the sweep is determined by the HORIZONTAL POSITION control and is close to the frequency setting of the CE-70, except that in the 2500 kHz/DIV setting the center is nominally the center of the instrument range, 12.5 MHz (LO of 63.2 MHz). The range of the sweep is determined by the setting of the kHz/DIV switch.

1.13 The CRT displays horizontally the full bandwidth selected by the kHz/DIV switch, with the graticule divisions indicating the frequency according to the switch setting. The frequency to which the CE-70 is set is at the center of the display except on the 2500 kHz/DIV range. On this range the center of the sweep is 12.5 MHz. Any point on the sweep can be set to the marker by tuning the CE-70, thus indicating the frequency at that point.

CIRCUIT DESCRIPTION

Master Phase Lock Loop, 2300

1.14 In this circuit, Figure 3-7, the 50.7-75.7 MHz LO output from the CE-70 is mixed with the output of the 51.2-76.2 MHz Master VCO on this board to produce a 500 kHz output. This output is compared with the 500 kHz reference frequency brought in from the Log Amp, 2200 board, in a phase detector. The phase detector output controls the frequency of the 51.2-76.2 MHz Master VCO. This forms a phase lock loop in which the 500 kHz offset is determined by the 500 kHz reference frequency, and the 51.2-76.2 MHz Master VCO frequency is phase locked to the 50.7-75.7 MHz LO frequency from the CE-70. A steering voltage, generated in a frequency-to-voltage converter on the 2400 board by the 50.7-75.7 MHz LO from the CE-70, brings the Master VCO within locking range whenever the frequency of the CE-70 tuning is changed.

1.15 The 500 kHz reference frequency comes in through board pin 14 and the buffer amplifier, Q5, to one input of the phase detector, U2.

1.16 The Master VCO, Q8, CR13, CR14, L19, output goes to the signal splitter circuit, T4, R15-R17, C20, C21, where one output is routed to the Slave VCO circuit on board 2500 through Q4 and J2. The other output goes through a power amplifier, Q3, a 50-75 MHz band pass filter, T3, L4-L6, C14-C16 to the phase lock mixer, T1, T2, CR1-CR4. The other input to the mixer is the CE-70 50.7-75.7 MHz LO which comes in through J1 and the amplifier, Q1, Q2.

1.17 The 500 kHz output of the mixer passes through an 8 MHz low pass filter, L11, L12, C33-C36, C72, through amplifier U1, to the other input of the phase detector, U2. The phase detector pulsating output goes to the Loop Compensation Amplifier, U3, and Unlatch circuit Q6, Q7 which prevents lockup in an off frequency condition, through a 400 kHz low pass filter, L14-L16, C50-C55 and peak limiter diodes, CR6-CR9 to summation amplifier, U4. The steering voltage from the frequency/voltage converter on board 2400 through board pin 20 also comes in to the summation amplifier, U4. The summation of these two voltages control the Master VCO, closing the phase lock loop and also providing a means of keeping the frequency within locking range after a frequency change or when the instrument is turned on.

1.18 U5 and the adjustment controls, R57, R58, R63 is a linearizing circuit that compensates for the frequency non-linearity introduced by the characteristics of the varicaps, CR14, CR14. R60 is a temperature compensating thermistor.

Slave Phase Lock Loop, 2500

1.19 The purpose of the Slave Phase Lock Loop, Figure 3-10, is to generate a 50.7-75.7 MHz LO that may be linearly swept over selected bandwidths (4 kHz, 60 kHz, 300 kHz, 3 MHz, 10 MHz) that are centered on the frequency to which the CE-70 is set, and also over the full 0-25 MHz (50.7-75.7 LO) band. One output from the VCO goes to the Marker/Variable Oscillator circuits on board 2400 and the other goes to board 2800, then to the CE-70 to furnish the LO for swept operation.

1.20 The 50.7-75.7 MHz output of the Slave VCO, Q3, L10, CR10-CR12 goes to the signal splitter circuit T5, C12, C13, R12-R14. One output of the Signal Splitter drives the two output buffers, Q4, Q5, to supply signals to the Marker/Variable Oscillator and the CE-70. The other output of the Splitter is amplified by Q2 and passed through the 50-75 MHz band pass filter, T4, L3-L5, C6, C7, C77 to one input of the mixer T2, T3, CR1-CR4. The other input to the mixer is the 51.2-76.2 MHz signal from the Master Phase Lock Loop, 2300, which comes in through J3 to the input buffer, Q1, through a 3 dB pad R5-R7 and 10 MHz high pass filter L2, C5.

1.21 The 500 kHz output from the mixer passes through the 8 MHz low pass filter C21-C24, L12, L13, to the amplifier, U1, and then to one input of the phase detector, U2. The other input to the phase detector is the 500 kHz swept oscillator. The pulsating output from the phase detector goes to Loop Compensation Amplifier, U3, with its unlatch circuit which prevents lockup in an off frequency condition, and from the amplifier to the 250 kHz low pass filter, L18-L20, C54-C60, through

the peak limiters, CR13-CR16, to the loop summation amplifier, U4. The steering voltage from the Marker/Variable oscillator board, 2400, comes in through board pin P1-20, through switch Q9, and also goes to the loop summation amplifier U4. Output from U4 then goes through negative peak limiter, CR17, switch Q11, linearizer U5, and then to the VCO varicaps CR10-CR12. Varicap non-linearity is compensated for by adjustment of breakpoint and bias controls R26, R30, R33, R41-R44.

1.22 The description of paragraph 1.21 applies when the kHz/DIV switch is in either the 0.4 kHz, 6 kHz or 30 kHz/DIV positions. In either the 300 kHz, 1000 kHz or 2500 kHz/DIV positions, outputs from the Switch Logic circuits, 2100, turn off switches Q9, Q11, and disable U3 through switch Q8. At the same time switches Q10, Q12 are turned on. The steering voltage through board pin P1-20 is then routed through Steering Amplifier U6, switch Q10, Ramp Summation amplifier U7, and switch Q12, to the Linearizer circuit U5, and then to the varicaps. The sweep voltages from the Sweep Generator/High Level Alarm board, 2700, are brought in through board pins P2-1, 2, 3, and through the Frequency Sweep Adjustment controls, R113-R115, which set the range of each sweep, to the Ramp Summation Amplifier U7, to combine with the steering voltage and thus control the sweep.

Marker and Variable Oscillator, 2400

1.23 The Variable Oscillator circuits, see Figure 3-9, provide the variable frequencies that are applied to the phase detector in the Slave Phase Lock Loop circuit to cause the variable LO output to be swept over the required bandwidth in the 0.4 kHz, 6 kHz and 30 kHz/DIV positions of the kHz/DIV switch. An LC oscillator is used for the 0.4 kHz/DIV bandwidth and an RC oscillator for the 6 and 30 kHz/DIV bandwidths.

1.24 The LC oscillator is a VCO, Q21, Q22, CR3, CR4, L11, which is controlled by the ramp voltage from the Sweep Generator, 2700. Output frequency is 500 kHz ± 2 kHz. The sweep ramp voltage enters through board pin P2-7, to the LC Volt Translator, U16, and is applied to the varicaps CR3, CR4. Sweep width is adjusted by R96. The center frequency of the sweep oscillator is set by adjusting L11. Output is taken from the top of L11 to Q23. The high impedance of Q23 provides light loading for the oscillator output. Q23, Q24 are buffer amplifiers and Q25, Q26 are current mode switches which square up the sine wave to provide a logic level output to inverter, U17-11, 12, 13. U17-4, 5, 6 is an OR gate for the outputs of the LC and RC oscillators. The input to to U17-4, 5, 6 from the oscillator that is not used is always high so that the logic levels from the oscillator in use will be inverted and pass through it. The LC oscillator is turned on by +12V from the kHz/DIV switch applied through board pin P2-12, when the switch is in the 0.4 kHz/DIV position.

1.25 The RC oscillator is an astable multivibrator, Q17, Q18. The frequency is adjusted by the current applied to the base of each transistor by the constant current sources Q15 and Q27. Current is supplied to these sources and the amplifier U15 by a +15V regulator U14, Q16. Collector current for the multivibrator is supplied by the +5V regulator, U14, Q20. The frequency of the oscillator is 500 kHz ± 30 kHz for the 6 kHz/DIV mode and is 500 kHz ± 150 kHz in the 30 kHz/DIV mode.

1.26 The frequency of the RC oscillator is caused to vary by the ramp voltage from the sweep generator which enters the board from the kHz/DIV switch, S1104, through board pin P2-6 for the 6 kHz/DIV mode and through pin P2-5 for the 30 kHz/DIV mode. Input through pin 6 is adjusted by R66 to control the 6 kHz/DIV bandwidths and R65 in like manner controls the 30 kHz/DIV bandwidth. R71 is adjusted to set the center frequency of the oscillator to 500 kHz. The sweep is inverted in buffer amplifier U16, and applied to the non-inverting inputs of U15. These amplifiers drive the constant current sources, Q15, Q27 to sweep the frequency of the RC oscillator, Q17, Q18. Output is buffered by Q19, inverted by U17-1, 2, 3 and applied to the OR gate, U17-4, 5, 6 and to the Slave VCO phase detector through board pin P2-21.

1.27 The Marker circuit generates a sharp pulse on the CRT display which indicates the frequency to which the CE-70 is tuned. This pulse consists of a one millisecond pulse of approximately 20 kHz oscillations. Marker circuits are distributed between the 2400, 2700 and 3000 boards.

1.28 In the 0.4, 6, 30 kHz/DIV modes an output from the LC or RC oscillator through WT18/5 (Figure 3-8) is connected to one input of the phase detector, U5, through AND gate U4-5, 6, 8, 9. At the same time an output from the 500 kHz Reference Oscillator through board pin P1-14, through amplifier Q5, and U3-5, 6, 8, 9 is brought to the other input of U5. When these two frequencies coincide (when the LC or RC oscillator sweeps through 500 kHz) the phase detector generates an output. Since the sweep is centered on 500 kHz, this coincidence point represents the center of the sweep.

1.29 Output from U5 through board pin P1-17 goes to the 2700 board pin P2701-16 (Figure 3-12) and to the Marker Gate Generator, U2707. U2707-11, 12, 13 is an inverter, U2707-8, 9, 10 is the enabling switch controlled by the Front Panel MARKER switch and U2707-1, 2, 3, 4, 5, 6 is an approximately one millisecond one-shot multivibrator. Output from the one-shot goes out through board pin P2701-14 to board 3000 and through board pin P3001-11 to the Marker Deflection circuits (Figure 3-16).

1.30 The negative output pulse from the one-

shot turns off switches Q3020, Q3022, Q3016, which cuts off the vertical deflection signal to the CRT. At the same time switches Q3021, Q3023, Q3018, are turned on, because the one-shot pulse is inverted through U1-4, 5, 6. This allows the output of the 20 kHz multivibrator U3001-1, 2, 3, 11, 12, 13, amplified by Q19, top and bottom clipped by Q3017, R3059, R3063, to pass to the vertical deflection amplifier for the duration of this pulse. The 20 kHz multivibrator is turned on by the one-shot pulse through U3001-4, 5, 6, 8, 9, 10. The marker pulse is thus a 20 kHz burst for a period of one millisecond.

1.31 In the 300 kHz, 1000 kHz, 2500 kHz/DIV modes input to the phase detector (Figure 3-8) is the Slave VCO 50.7-75.7 MHz through J1 and the current mode switch, Q1-Q4, which shapes the input to U1 to approximately a square wave. U1 divides the frequency by 4 and U2 divides the U1 output by 10. U2 output is applied to the phase detector through the switch U3. An output from the CE-70 50.7-75.7 MHz LO through J2 and the current mode switch, Q6-Q9, is divided by 4 in U8 and the output divided by 10 in U7 and the output applied to the other input of the phase detector, U5, through switch U4. When these two frequencies coincide, which will occur when the CE-71 slave VCO passes through the frequency to which the CE-70 is tuned, the phase detector produces an output and the Marker pulse is generated as described above. The switches U3, U4 select the input to the phase detector according to the setting of the front panel kHz/DIV switch.

1.32 The output of the Frequency-to-Voltage converter, the steering voltage, is used in the phase locked mode (0.4, 6, 30 kHz/DIV) to bring the Master and Slave VCOs within the phase lock range at the correct frequency as determined by the frequency dialed up on the CE-70. In the 300 and 1000 kHz/DIV mode the steering voltage centers the sweep ramp on the frequency to which the CE-70 is tuned. In the 2500 kHz/DIV mode this output is not used.

1.33 The output of U7 also goes to the two divide-by-10 circuits, U6, U9, for a division by 100, to the inverter U10-1, 2, 3 and then to the flip-flop latch U10-8, 9, 10, 11, 12, 13. The latch is turned on, output high, by the signal out of U9. It is turned off by the sweep generator Q10 and the threshold detector U11. The slope of the sweep generator ramp is a function of C36, R36. The comparator level for U11 is the voltage drop across R35. The time it is off is determined by the signal frequency from U9, therefore the duty cycle of the latch is directly proportional to frequency.

1.34 The latch output through buffer amplifier and wave shaper Q11-Q14 is tied to definite levels between 0 and +5 volts. U12 is connected in as a 3-pole active filter to convert the pulse output to a DC voltage that is proportional to frequency. U12 buffers the voltage to the steering amplifier and 80 Hz low pass filter, U13. R50, R52 set the limits of the steering voltage output.

Sweep Generator and High Level Alarm, 2700

1.35 This circuit, refer to Figure 3-12, generates the ramp voltage which controls the horizontal deflection amplifier of the CRT and sweeps either the LC or RC oscillator or the Slave VCO. Six individual repetition rates are generated, 0.5 Hz (2000 ms) for 0.4 kHz/DIV, 2.2 Hz (450 ms) for 6, 30, 300 kHz/DIV, 1.0 Hz (1000 ms) for 1000 kHz/DIV and 0.4 Hz (2500 ms) for 2500 kHz/DIV modes.

1.36 The ramp is generated by charging C9 through switch Q5 and charging resistor R5, R6, R7, R8, R9 or R10 as selected by the kHz/DIV switch. The ramp is buffered by U8 and connected to the horizontal deflection amplifier through board pin P1-13. The ramp is also connected to U9, U10, which controls the flip-flop U1-1, 2, 3, 4, 5, 6, to generate the reset pulse. The reset pulse is inverted by U3-8, 9, 10 and goes through pin P2-11 to the blanking enable gates on the switch logic board, 2100. The reset pulse from U1-6 is also connected to the input switches Q2, Q4 to turn on Q6 in order to discharge C9, which generates the retrace sweep. At the end of the reset pulse Q6 is turned off and C9 again starts to charge through the selected charging resistor.

1.37 An output from U8, connected to U11, is amplified, inverted and connected to the inputs of the sweep mode switches, Q7-Q12. The output of these switches sweep the various oscillators. The proper switch is turned on by the same connection from the kHz/DIV switch that selects the proper charging resistor for the ramp. Sweep center position is adjusted by the HORIZONTAL POSITION control as it adjusts a DC bias to the input of U11 through board pin P2-21.

1.38 In the SINGLE SWEEP mode the output to the blanking amplifier is taken through board pin P2-10 instead of pin P2-11. When the SINGLE SWEEP PUSH TO START switch is depressed there is a closure to ground through board pin P2-16 and a pulse is applied to U2-5 through C22 to set the flip-flop, U2-1, 2, 3, 4, 5, 6. When the flip-flop is set U2-9, 12 is enabled so that at the end of the reset pulse from U1-6 to U2-10, 13, the single sweep flip-flop, U3-4, 5, 6, 11, 12, 13 is set enabling the blanking gates to unblank the trace for one sweep. The single sweep light in the push button is controlled by the single sweep enable gates. After the SINGLE SWEEP push button is released C22 charges again through R33 so another sweep cannot be triggered until the push button is released and again depressed.

1.39 In the MANUAL mode the CRT trace is unblanked through the blanking circuits by SWEEP switch S1105, at the same time +20V, instead of -12V, is applied to the junction of CR1 and CR2. This voltage turns on Q1 and applies a

positive bias to the base of Q4 to keep Q6 biased off. A voltage, adjusted by the MANUAL TUNE control, R1006, connected through board pin P2-20 and Q1, is applied to U8-3 to adjust the CRT beam across the screen according to the setting of the TUNE control.

1.40 The vertical deflection circuit in the Logarithmic Amplifier, 2200, is connected to the comparator U2203. Whenever the vertical amplitude exceeds the level set into the comparator by R2244, U2203 generates an output which is connected through board pin P2-17 to the squaring buffer Q3. A high level pulse from Q3 through U4-10, 8 causes the trigger flip-flop U4-1, 2, 3, 4, 5, 6 to change state which causes U5 to count one. At the third count, the output through U6-10, 8 triggers the high level alarm latch U6-1, 2, 3, 11, 12, 13 which turns on switch Q13, to operate the high level alarm relay and the front panel ALARM light. The circuits stay locked in this condition until the pulse from the PUSH TO RESET or from the HIGH LEVEL ALARM switch when it is turned off resets the circuit.

1.41 The High Level reset pulse through board pin P2-18 to U1-13 generates a reset pulse to the counters through U1-8. If there is not a second high level pulse to U4-10, that sweep resets the trigger flip-flop through U4-11, C27. The coincidence of pulses from U4-11 and U4-6 triggers AND gate U6-4, 5, 6 to generate a reset pulse to the counter through U1-12, 8.

Switch Logic, 2100

1.42 This board, see Figure 3-5, contains the switching logic, controlled by the front panel switches, which operates the switches in the Master and Slave Phase Lock Loop circuits, 2300, 2500, the Sweep Generator/Hi Level Alarm, 2700, and the Reference Oscillator on the Log Amplifier board, 2200.

1.43 The 0.4 kHz/DIV sweep switch is controlled through Q3 and the LC oscillator power is turned on through CR3, Q2. 6 kHz and 30 kHz/DIV sweeps are controlled by Q4, Q5 respectively while the RC oscillator is turned on through CR1 or CR2 and Q1. In the 300 kHz, 1000 kHz and 2500 kHz/DIV the switches are operated by Q6-Q11 and inverters, U1. In addition, the steering circuits are enabled (for 300 kHz and 1000 kHz/DIV circuits only) through U3-1, 2, 3, Q12, Q13, the Sweep Oscillator through U2-8 and Sweep Enable through Q14, Q15. Also, the Phase Lock Loop circuits and the +20V switched power to the Reference Oscillator and to the Master Phase Lock Loop are turned on by U1-3, 4, Q16, Q17, Q19, Q20. The LEVELMETER SWEEP switch, S1106, controls the +20V for the switched supply, through Q18, Q21, Q22, and enables the blanking circuits through U3-4, 6. The individual sweep and blanking requirements are selected through U2-3, 4, 5, 6 and U3-8, 9, 10, 11, 12, 13. U1-12, 13, Q25, Q26 control the Manual Sweep enable and Q23, Q24 control the front panel single sweep indicator.

RF Switch, 2800

1.44 This circuit controls the input and output signals from and to the CE-70 and to the CE-72, by means of PIN diode switches. See Figure 3-13. Each switch is made up of a pair of PIN diodes, such as CR1, CR2, which are turned on, switch closed, by applying +12V to the junction of the anodes of the diodes through a decoupling filter such as L8, C33, and isolating resistor R25. C34 provides additional isolation when the switch is open, when -12V is applied to the junction of the anodes. When the cathodes of the diodes are joined, as in CR5, CR6, -12V applied to the junction closes the switch and +20V opens it. Buffer amplifiers supply additional gain and isolation and transformer coupling is used where necessary to break up DC ground loops.

1.45 The LO signal from the CE-70 comes in through J1, "A", through T1 to the buffer amplifiers Q1, Q2, to the Marker circuits, and through buffers Q3, Q4, to the Master Phase Lock Loop circuits. These two circuits are not switched but are connected continuously. In the LEVELMETER MANUAL mode the LO from the CE-70 also goes through buffer Q5 and switch #1, CR1, CR2, and #2, CR3, CR4 to output amplifier Q6-Q8, through T2 and J4, "E" back to the CE-70. In the SWEEP mode switches #1 and #2 are opened and the swept LO from the Slave VCO through buffer Q9, matching transformer T3, through switch #7, CR5, CR6, which is closed whenever switches #1 and #2 are opened, goes to the output buffer, Q6-Q8 and out through J4, "E", to the CE-70.

1.46 In the SIG GEN MANUAL mode the LO input from the CE-70 through J2, "C", comes in through T5 and buffer Q11, and through switches #3, CR11, CR12, and #4, CR13, CR14, to buffer amplifier Q12-Q14, through T6 and out through J3, "F", to the CE-72 for use when the CE-72 is used in the EXT TUNING mode. Switches #3, #4 are turned on by +12V from the SIG GEN switch and switches #5, CR7, CR8, #6, CR9, CR10 are turned off. In the SIG GEN SWEEP mode -12V from the SIG GEN switch turns off switches #3, #4 and turns on switches #5, #6 to pass the Slave swept VCO output to the CE-72. Q15 functions as a switch control on the line from the CE-71 to the CE-72. In the SWEEP mode of the SIG GEN switch, +13V is connected to the base of Q15 through P1-22 which turns it on putting a DC ground on the line to the CE-72. This disables the TCXO of the CE-72 synthesizer. In the MANUAL mode the circuit to the base of Q15 is opened, allowing it to go to ground through R69 turning Q15 off. This allows the line to the CE-72 to go to +5V which puts the CE-72 TCXO under control of the INT/EXT TUNING switch on the CE-72.

80 kHz Band Pass Filter, 2600

1.47 Four bandpass filters restrict the third IF bandwidth as necessary for the more narrow sweep widths, see Figure 3-11. Each filter is switched in according to the setting of the kHz/DIV switch. The filter switches are FETs at the input and output of each filter. In addition there is a FET

switch to isolate the three higher frequency bandwidth matching pads. The 45 Hz crystal filter is mounted external to the board but the switches for this filter are mounted on the board.

1.48 Overall gain of the circuit, when all tuning adjustments have been made, is determined by the gain of the input 80 kHz tuned amplifier and the insertion loss of the 400 Hz band pass filter in the 6 kHz/DIV channel. All other channels are adjusted to the same gain by the adjustable resistors in the pads for each channel. Each channel is controlled by the logic switches on the Switch Logic board, 2100. Input to the board is controlled by a connection to the LEVELMETER SWEEP/MANUAL switch which controls the switch Q1, Q2 to ground the DC input through Q1 while maintaining a high impedance at 80 kHz when the switch is in the SWEEP mode.

Logarithmic Amplifier, 2200

1.49 The Logarithmic Amplifier, Figure 3-6, accepts the linear amplitude input (80 kHz) signal and transforms it into a logarithmic response signal for display on the CRT.

1.50 The 80 kHz IF input comes in through board pin 18, through peak limiters, CR1, CR22 to the tuned amplifier, Q1, and buffer, Q2. Output from Q2 is connected directly to U1-4. It is also connected to the 30 dB attenuator R9 and buffer Q3 and then to U1-7. Q2 output also goes to the 30 dB amplifier, Q4-Q6, the output of which is connected to U1-12 and to the input of 30 dB amplifier Q7-Q9. Output of Q9 is connected to U1-9.

1.51 The Log Converter sums up the four inputs, -30 dB, 0 dB, +30 dB, +60 dB, and converts them into a logarithmic response output. The logarithmic output is detected by U2, CR3, CR4 and the DC envelope is passed through low pass filter U6 to remove any remaining AC components. Output then goes to the VERTICAL SENSITIVITY switch, S1104, on the Switch Mounting board, through board pin 19.

1.52 Output from S1104 comes back in through board pins 21, 22 through input resistors, R41, R42, to the Video Amplifier/Filter, U4, which amplifies the signal X3.3 or X33, corresponding to 10 dB/DIV or 1 dB/DIV. Output then passes through Bottom, CR15, R51 and Top, CR16, R52, clippers to the Vertical Deflection Buffer, U5, and out to the Vertical Deflection Amplifier through board pin 12. The DC level is compared in U3 to a reference set by R44 to detect a high level as part of the High Level Alarm circuitry.

1.53 The 500 kHz Reference Oscillator, which is used in the 0.4 kHz, 6 kHz and 30 kHz/DIV modes, is also mounted on this board. The Oscillator, Q12, Q13, Y1, is controlled by the kHz/DIV switch which switches on the +20V power as required. Output goes to the Current Mode Switch, Q10, Q11, which changes the sine wave output to an essentially square wave logic level signal which passes out through board pin 14 to the other circuits where it is used.

High Voltage Power Supply/Deflection Amplifier, 3000

1.54 This circuit board contains both the Horizontal and Vertical Deflection Amplifiers, the Internal Blanking Amplifier, the Marker Deflection circuits, see Figure 3-16, and the High Voltage Power Supply, Figure 3-15. The Marker Deflection circuit was described in paragraph 1.30.

1.55 Output from the Ramp Generator in the Sweep Generator/High Level Alarm circuits, 2700, enters through pin P1-9 to the Horizontal Gain control, R45 and to the Horizontal Deflection Amplifier, Q9-Q15. Q13 is a current source for the emitters of Q11, Q12 to aid in maintaining sweep linearity. The single ended input to this amplifier is changed to a push-pull output that drives the horizontal deflection plates in the CRT through board pins P1-21, 22.

1.56 The Vertical Display amplifier is the same as the Horizontal Deflection amplifier. The amplifier is made up of Q24-Q30, Q29 being the constant current source for the emitters of Q26, Q26 to aid in maintaining vertical linearity. Input to the amplifier from the Logarithmic Amplifier, 2200, is through board pin P1-12 to the Vertical Gain control, R55, and through input switch Q16. Output goes to the CRT vertical deflection plates through board pins P1-18, 19.

1.57 Input to the Internal Blanking Amplifier from the Blanking Enable gates in the Switch Logic circuits, 2100, enters through board pin P1-13 and isolating diode, CR15, to the positive input of blanking amplifier, U2, Q32. Q31 is a current source to maintain a fast rise time when Q32 is turned on. The negative output pulse to the low side of the CRT control grid high voltage supply, Figure 3-15, blanks the circuit during retrace. The voltage output of the INTENSITY control, R1001, is summed with the blanking input to U2 to control the beam intensity by adjusting the CRT control grid bias.

1.58 The High Voltage Power Supply rectifier, Z1, output is regulated by series regulator, Q3033. Refer to Figure 3-15. The error amplifier that controls Q3033 is U3. R32 adjusts the voltage output. CR8 regulates the supply voltage to U3. CR9 supplies the reference voltage for U3 and Q8, R31 limits the short circuit output of the regulated supply. Output from the supply goes to oscillator output power amplifiers, Q2, Q6, through the midtap of the primary of transformer, T1.

1.59 The Frequency Generator, U4, is the oscillator. Frequency is determined by R1, R2, R3, C1. R2 is made variable to provide some frequency adjustment. The output frequency of 29.1 kHz is divided by two in the J-K flip-flop, U5. The two outputs of U5 drive the buffer amplifiers, Q1, Q3, which in turn drive the output power amplifiers, Q2, Q6, which provide the input to the

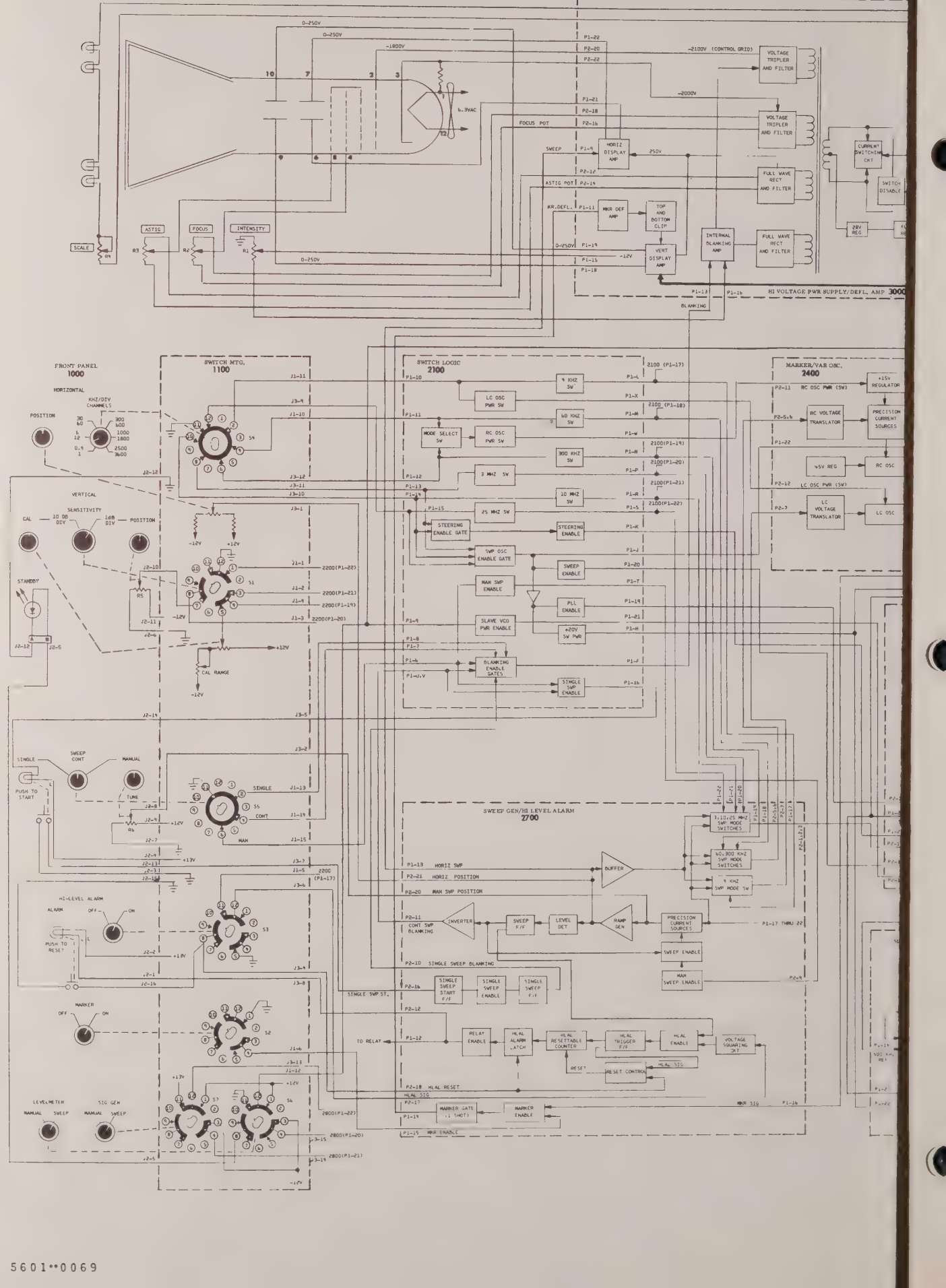
primary of transformer, T1. Q4, Q5, Q7 are a disable gating circuit which disables the input to Q2, Q6 during the square waveform transition to eliminate a heavy current flow which would otherwise occur during this transition.

1.60 Four secondaries of T1 supply the four rectifier circuits to provide the required high voltages for the instrument. Two tripler rectifiers CR1, CR2, CR3 and CR4, CR5, CR6 provide the negative high voltages, approximately -2100V, to the control grid of the CRT and -2000V to the cathode. The cathode voltage is referenced to ground and the control grid voltage is referenced to the output of the blanking amplifier. Blanking is accomplished by driving the CRT grid sufficiently negative to cut off the beam current. Intensity control is accomplished by adjusting the output level of the blanking amplifier with the INTENSITY control. R19 sets the INTENSITY control range. The FOCUS control is part of a divider across the cathode voltage.

1.61 The other voltages required by the deflection and blanking circuits are supplied by the two bridge rectifiers, Z2, to supply +240V and Z3 to supply +100V. The ASTIG control is a divider across the +240V output.

Low Voltage Power Supply, 2900

1.62 Three bridge rectifier circuits, CR1-CR4, CR5-CR8, CR9-CR12 and five regulator circuits provide the required low voltage outputs, two +5V, one each +12V, -12V and +20V, see Figure 3-14. U1 is the -12V regulator, U2, U3 are the two +5V regulators. U5 is a +12V regulator which is connected to the +20V regulated output. Q3 is the series regulator for +20V, U4 the error amplifier and Q4 the regulator driver amplifier. R9 is the +20V adjust control and CR13 furnishes the reference voltage. R3 is the current limit sense resistor which causes Q1, Q2 to shut down the driver amplifier, Q4, in case of overload. Q5, Q6 form the short circuit shut down control. This circuit, when operated, holds the driver amplifier, Q4, off until the AC power has been removed from the instrument for approximately 30 seconds. The circuit is triggered into operation whenever the +20V supply is pulled down to approximately +8V.


FRONT PANEL 1000
SWITCH MTG. 1100
SWITCH LOGIC 2100
MARKER/VAR OSC. 2400
SWEEP GEN/HI LEVEL ALARM 2700
HORIZONTAL
VERTICAL
POSITION
SENSITIVITY
CAL
STANDBY
SINGLE
SWEEP CONT
MANUAL
PUSH TO START
TUNE
HI-LEVEL ALARM
ALARM
OFF
ON
PUSH TO RESET
MARKER
LEVEL METER
MANUAL
SWEEP
SIG GEN
SCALE
ASTIG
FOCUS
INTENSITY
FOCUS POT
SWEEP
ASTIG POT
BLANKING
HI VOLTAGE PWR SUPPLY/DEFL. AMP 3000
VOLTAGE TRIPLER AND FILTER
FULL WAVE RECT AND FILTER
HORIZ DISPLAY AMP
VERT DISPLAY AMP
INTERNAL BLANKING AMP
TOP AND BOTTOM CLIP
MKR DEF AMP
CURRENT SWITCHING CKT
SWITCH DISABLE
28V REG
-2100V (CONTROL GRID)
-2000V
250V
-12V
6.3VAC
0-250V
-1800V
9 KHZ SW
60 KHZ SW
300 KHZ SW
3 MHZ SW
10 MHZ SW
25 MHZ SW
LC OSC PWR SW
RC OSC PWR SW
MODE SELECT SW
STEERING ENABLE GATE
SWP OSC ENABLE GATE
MAN SWP ENABLE
SLAVE VCO PWR ENABLE
BLANKING ENABLE GATES
SINGLE SWP ENABLE
SWEEP ENABLE
PLL ENABLE
+20V SW PWR
STEERING ENABLE
+15V REGULATOR
RC VOLTAGE TRANSLATOR
PRECISION CURRENT SOURCES
45V REG
RC OSC
LC VOLTAGE TRANSLATOR
LC OSC
RC OSC PWR (SW)
LC OSC PWR (SW)
BUFFER
INVERTER
SWEEP F/F
LEVEL DET
RAMP GEN
PRECISION CURRENT SOURCES
SWEEP ENABLE
MAN SWEEP ENABLE
3,10,25 MHZ SWP MODE SWITCHES
60,300 KHZ SWP MODE SWITCHES
9 KHZ SWP MODE SW
HORIZ SWP
HORIZ POSITION
MAN SWP POSITION
CONT SWP BLANKING
SINGLE SWEEP BLANKING
SINGLE SWP ST.
SINGLE SWEEP START F/F
SINGLE SWEEP ENABLE
SINGLE SWEEP F/F
RELAY ENABLE
HLAL ALARM LATCH
HLAL RESETTABLE COUNTER
HLAL TRIGGER F/F
HLAL ENABLE
VOLTAGE SQUARING CKT
RESET
RESET CONTROL
HLAL SIG
HLAL RESET
MARKER GATE (1 SHOT)
MARKER ENABLE
MKR ENABLE
TO RELAY
P1-17 THRU 22
2200 (P1-17)
2800(P1-22)
2800(P1-20)
2800(P1-21)

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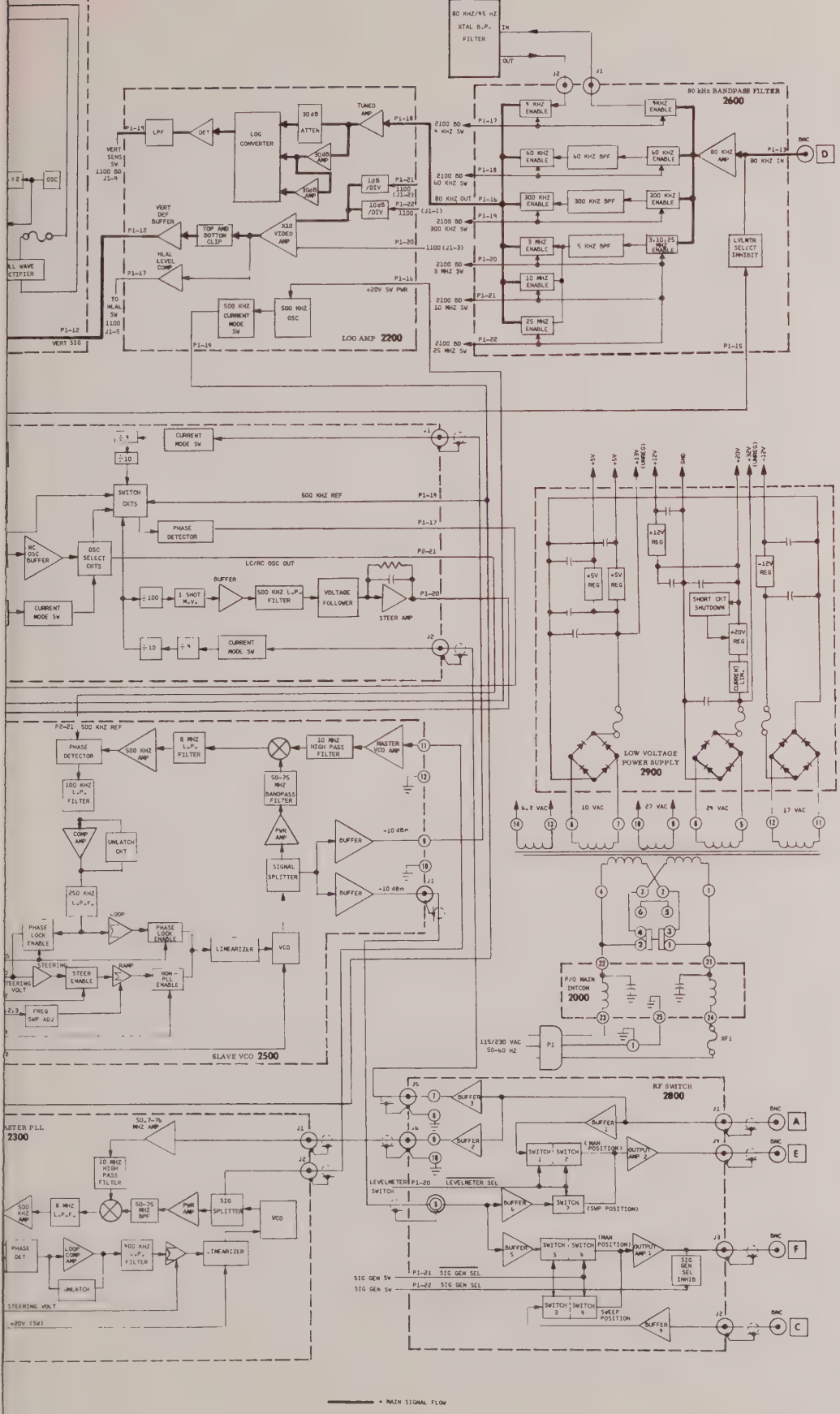


Figure 1-2. Model CE-71 Overall Block Diagram

SECTION 2
MAINTENANCE

GENERAL

2.01 This section of the manual contains the information necessary to check the performance and to calibrate and adjust the CE-71 Spectrum Display unit.

2.02 Performance checks may be used to verify proper operation or as an incoming inspection check. Calibration and adjustment procedures should be followed if the Performance Check indicates out-of-tolerance operation. (Master and Slave Phase Lock Loop linearity and Band Pass Filter adjustments require special techniques and should not be attempted in the field).

2.03 If adjustment procedures fail to correct the out-of-tolerance operation and the cause of the trouble is not readily apparent or if sufficient repair facilities are not available, it is recommended that the faulty circuit board or the whole instrument be returned to the factory or a Service Center for repair. Always contact the Cushman Electronics Customer Service Department before shipping equipment to either a Service Center or to the factory. Refer to paragraphs 2.29 to 2.32.

PERFORMANCE CHECKS

2.04 The following preliminary instructions should be carried out prior to making the performance checks.

a. Install the modification kit cables for the CE-70 if this has not already been done. The cables are part of the accessories shipped with the CE-71. Cables "X" and "W" are connected according to the drawing on the inside of the top cover of the CE-70.

NOTE: After making above modification, a short BNC to BNC coax cable must be used to connect the AA and EA rear panel connectors when the CE-70 is removed from the combined instrument setup and used by itself.

b. Make rear panel connections between the CE-70, CE-71, CE-72 with cables provided. See Figure 2-1. Connect CE-72 OUTPUT to the CE-70 INPUT.

c. Check switch on rear panel to make certain the AC voltage showing is the same as the AC voltage source.

d. Plug the CE-71 AC cord into AC receptacle on the CE-70 rear panel and plug CE-70 and CE -72 into the AC source. Allow instruments to warm up for a few minutes before starting performance checks.

e. When comparing the CRT trace with the graticule lines, bear in mind the possible error in reading due to parallax. Since the trace is separated from the graticule by the thickness of the CRT faceplate, the graticule must be viewed from a point directly perpendicular to the trace to prevent parallax error.

Equipment Required

2.05 Any instrument equivalent to that listed below may be used.

Frequency Selective Levelmeter	CE-70
Signal Generator	CE-72

2.06 Make the following control settings on the instruments:

a. CE-70:

NORM/EXP	NORM
LEVEL	0 dBm
TONE/NOISE	TONE
BANDWIDTH	1.74 kHz
VERNIER	CAL
IMPEDANCE	75Ω
FREQUENCY	12500.00 kHz
VOLUME	PWR ON
SEARCH	OFF

Calibrate the CE-70 according to instructions in the CE-70 Instructions Manual.

b. CE-72:

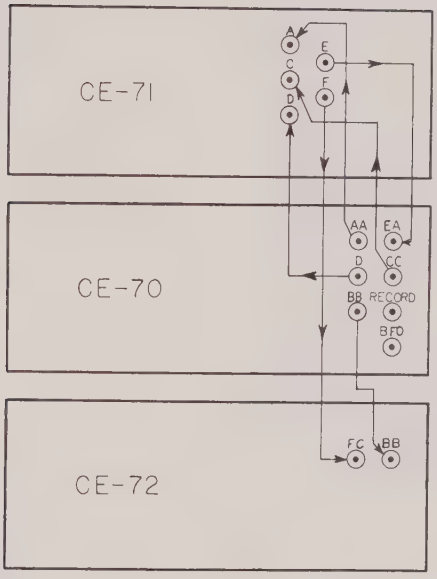
OUTPUT	ON
TUNING	EXT
POWER	ON
OUTPUT	75Ω
LEVEL	0 dBm
FINE	Set for 0 dBm output

c. CE-71:

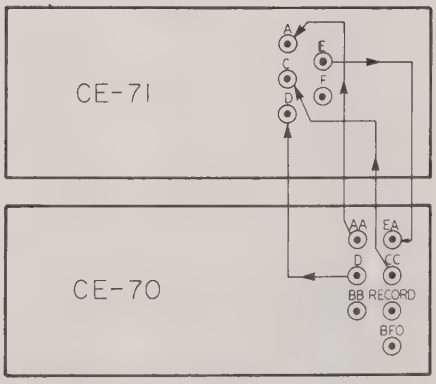
VERTICAL	10 dB/DIV
HI LEVEL ALARM	OFF
MARKER	OFF
HORIZONTAL	2500 kHz/DIV
SWEEP	CONT
LEVELMETER	MAN
SIGNAL GEN	MAN
INTENSITY	Fully CW

2.07 CRT Trace

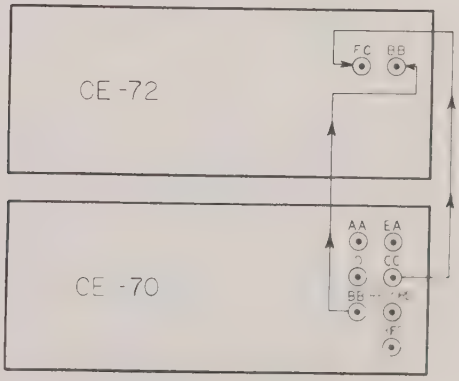
a. Set LEVELMETER switch to SWEEP.



CE-71, CE-70, and CE-72 Rear Panel Connections



CE-71 and CE-70 Rear Panel Connections



CE-72 and CE-70 Rear Panel Connections

Figure 2-1. Combined Instruments Rear Panel Connections

Trace should appear on CRT.

b. Turn INTENSITY control fully CCW. Trace should disappear. Turn INTENSITY CW until trace appears. Should appear at 1/4 to 1/2 turn CW. Set INTENSITY for a comfortable viewing level.

c. Turn LEVELMETER switch to MANUAL. CRT trace should disappear and yellow STANDBY light should come on. Turn switch back to SWEEP.

d. Turn SWEEP switch to SINGLE. Trace should disappear. Depress PUSH TO START button. A single trace should go across the CRT and the pushbutton light should come on for the duration of the sweep. There should not be another trace until the button is again depressed.

e. Turn SWEEP switch to MANUAL. Adjust TUNE control. Spot on CRT should move across the screen as the control is turned. Set SWEEP switch back to CONT.

2.08 Signal Center Accuracy

a. Adjust HORIZONTAL POSITION control until signal is on the Fo line. Do not touch POSITION control for the remainder of this test. Adjust CAL control until signal peak is at the 0 dB graticule line.

b. Set the CE-70 LEVEL to -30 dBm.

c. Set the kHz/DIV switch to each position from 2500 kHz/DIV to 0.4 kHz/DIV. The signal should remain between the -2 and +2 graticule lines.

2.09 Horizontal Linearity

a. Set the CE-70 LEVEL to -109 dBm. Set the CE-72 TUNING to INT, Frequency to 2500 kHz, Level to +10 dBm. Set the CE-71 HORIZONTAL switch to 2500 kHz/DIV.

b. Observe the position of the 11 vertical signals on the CRT display. (These are harmonics of 2500 kHz generated due to overloading of the CE-70 first mixer). The signals should fall on the vertical graticule lines ± 0.3 DIV.

c. Set the CE-72 Frequency to 1000 kHz ± 1 kHz. Set the CE-71 to 1000 kHz/DIV.

d. Set center line to Fo graticule line using HORIZONTAL POSITION control. Signals should fall on graticule lines within ± 0.5 DIV.

e. Set CE-70 to 500.00 kHz and repeat d.

f. Set the CE-70 to 20,000.00 kHz and repeat d.

g. Set the CE-70 to 12,500.00 kHz. Set CE-71 to 300 kHz/DIV. Set CE-72 Frequency to 300 kHz ± 0.5 kHz and repeat d.

h. Set CE-70 to 2000.00 kHz and repeat d.

i. Set CE-70 to 23000.00 kHz and repeat d.

j. Set the CE-70 to 4500 kHz and Level to -30 dBm. Set CE-72 to 4500 kHz and Level to -20 dBm. Set the CE-71 to 30 kHz/DIV. Align the signal to the Fo line with HORIZONTAL POSITION control.

k. Tune the CE-72 to the following frequencies: 4350, 4410, 4470, 4530, 4590, 4650 kHz, and note position of each frequency signal with reference to the appropriate graticule line (-5, -3, -1, +1, +3, +5). They should be within ± 0.2 DIV.

l. Set the CE-71 to 6 kHz/DIV. Set the CE-72 to 4500 kHz and align the signal to the Fo graticule line.

m. Tune the CE-72 to the following frequencies: 4470, 4482, 4494, 4506, 4518, 4530 kHz, and note the position of each frequency signal with reference to the appropriate graticule line (-5, -3, -1, +1, +3, +5). They should be within ± 0.2 DIV.

2.10 Vertical Display Linearity 10 dB/DIV

a. Set the CE-72 TUNE to EXT, Level to 0 dBm. Set CE-70 Level to 0 dBm. Set the CE-71 HORIZONTAL switch to 30 kHz/DIV.

b. Adjust the CE-71 CAL control to set the signal peak to 0 dB on the graticule.

c. Set the CE-72 Level to -10 dBm and -20 dBm. The signal on the CE-71 graticule should drop to -10 and -20 dB respectively ± 2 dB.

d. Reset the CE-72 Level to 0 dBm. Adjust the CE-70 Level to -10, -20, -30, -40 dBm. Signal on CE-71 graticule should increase to +10, +20, +30, +40 dB respectively ± 2 dB.

2.11 Vertical Display Linearity 1 dB/DIV

a. Set the CE-72 Level to -20 dBm. Set the CE-70 Level to -20 dBm. Set the CE-71 SENSITIVITY to 1 dB/DIV. Adjust the VERTICAL POSITION to set the signal peak to 0 dB on the graticule.

b. Adjust the CE-72 Level from -22 dBm to -16 dBm in 1 dB steps. The signal level peak should increase from the -20 dB graticule line to the +40 dB graticule line in intervals of 1 dB/DIV within ± 0.5 DIV.

c. Set the CE-70 Level to -60 dBm. Adjust CE-71 VERTICAL POSITION to

set the signal level peak to the 0 dB graticule line.

d. Repeat step b.

2.12 Marker Accuracy

a. Set CE-72 Level to 0 dBm. Set the CE-70 Level to -30 dBm. Set the CE-71 VERTICAL SENSITIVITY to 10 dB/DIV, HORIZONTAL to 0.4 kHz/DIV, MARKER to ON.

b. The Marker should be superimposed on the signal within ± 0.2 DIV.

c. Set HORIZONTAL to 6 kHz/DIV, 30 kHz/DIV, 300 kHz/DIV, 1000 kHz/DIV, and to 2500 kHz/DIV. In each case the Marker should be superimposed on the signal ± 0.2 DIV.

2.13 Hi Level Alarm Accuracy

a. Set the CE-70 Level to 0 dBm. Set the CE-71 HORIZONTAL to 6 kHz/DIV, MARKER to OFF and HI LEVEL ALARM to ON.

b. Set the signal peak to the 0 dB graticule line with the CAL control.

c. Adjust the CE-70 Level to -1 dBm. The HI LEVEL ALARM light should turn on after three sweeps. Depress the PUSH TO RESET button to start another three sweep sequence.

d. If the light fails to operate adjust the CAL control until the ALARM light comes on. The light should come on when the signal peak is within ± 1 dB of the + 1 dB line on the graticule.

2.14 Signal Level Accuracy 10 dB/DIV

a. Set the CE-70 Level to -30 dBm. Set the CE-71 SENSITIVITY to 10 dB/DIV, set SWEEP to CONT.

b. Adjust the CAL control until the peak signal level is at the +30 dB graticule line.

c. Set the SIG GEN to MANUAL. Set the SWEEP switch to MANUAL. Adjust TUNE for maximum CRT spot travel on the CRT. The spot should follow on the +30 dB line ± 2 dB.

d. Set SWEEP switch to CONT. The spot should be on the +30 dB line ± 2 dB.

e. Set SIG GEN switch to SWEEP. The trace should be on the +30 dB line ± 2 dB.

f. Repeat steps c. through e. for 2500 kHz/DIV, 1000 kHz/DIV, 300 kHz/DIV, 30 kHz/DIV, 6 kHz/DIV and 0.4 kHz/DIV. The signal trace should be on the +30 dB line ± 2 dB at all settings.

2.15 Signal Level Accuracy 1 dB/DIV

a. Set the CE-71 SIG GEN to SWEEP, HORIZONTAL to 0.4 kHz/DIV, SENSITIVITY to 1 dB/DIV, SWEEP to CONT.

b. Set the signal peak to the +30 dB line with the VERTICAL POSITION control.

c. Set SIG GEN switch to MANUAL. Set SWEEP switch to MANUAL. Adjust TUNE for maximum CRT spot travel on the CRT. The spot should follow on +30 dB reference line ± 2 dB.

d. Set SWEEP switch to CONT. The CRT spot should be on the +30 dB line ± 2 dB.

e. Set SIG GEN switch to SWEEP. The CRT trace should be on the +30 dB line ± 2 dB.

f. Repeat steps c. through e. for 2500 kHz/DIV, 1000 kHz/DIV, 300 kHz/DIV, 30 kHz/DIV, 6 kHz/DIV and 0.4 kHz/DIV. The signal level should be on the +30 dB line ± 2 dB at all settings.

2.16 Spurious Response Check

a. Set CE-70 Level to -20 dBm, set Frequency to 12.5 MHz, Set TONE/NOISE to TONE. Set CE-71 LEVELMETER to SWEEP, SIG GEN to MANUAL, HORIZONTAL to 2500 kHz/DIV, VERTICAL to 10 dB/DIV. Set CE-72 TUNING to EXT, Level to 0 dBm.

b. The LO spike will be observed on the far left side of the CRT. The 12.5 MHz signal will be observed at the center of the screen at the +20 dB graticule line. Except for these signals, no signal throughout the frequency range should rise above the -15 dB graticule line.

c. Change the HORIZONTAL switch to 1000 kHz/DIV, 300 kHz/DIV, 30 kHz/DIV, 6 kHz/DIV, 0.4 kHz/DIV. In each switch setting the signal will be observed at the center of the screen on the +20 dB graticule line. No other signals should rise above the -15 dB graticule line.

d. Set the CE-71 HORIZONTAL to 2500 kHz/DIV. Set the CE-70 TONE/NOISE switch to NOISE, and Level to -20 dBm.

e. The typical noise level peaks on the spectrum display should be below the -10 dB graticule line, but never should exceed the -5 dB graticule line.

f. Change the HORIZONTAL switch to 1000 kHz/DIV, 300 kHz/DIV, 30 kHz/DIV, 6 kHz/DIV, 0.4 kHz/DIV. At each setting the signal will be observed at the center of the CRT screen on the +20 dB

graticule line. No other signal should rise above the -10 dB graticule line.

g. Repeat step f. for CE-70 frequencies set from 1 MHz through 25 MHz in 5 MHz steps. Except for the LO signal, image frequency and the true signal, no signal should rise above the -10 dB graticule line.

ADJUSTMENT AND CALIBRATION

2.17 Connect the instruments to the AC source and follow preliminary instructions as given in paragraph 2.04 a. through e.

Equipment Required

2.18 Any instrument equivalent to that listed below may be used.

Frequency Selective Levelmeter	CE-70 M5
Signal Generator	CE-72
DMM	Dana 4300
Counter	Dana 8020
High Voltage Probe	Dana 82
Variable Transformer	GR W8MT3

2.19 Low Voltage Power Supply

a. Plug the variable transformer into the AC source and plug the AC cord from the CE-70 into the variable transformer. Turn on the variable transformer and the CE-71 and adjust the transformer output for 115V.

b. Connect the DMM to J2014-16 (+20V bus on connector for 2900 board, see Figure 3-2, 3-14). Adjust R2909 (20V), see Figure 3-4, until the DMM reads +20V ± .02V DC.

c. Check that the voltage at each pin listed below is within the limits shown:

J2014 Pin	Voltage	Tolerance
6	+33V	± 5V
10	+5V	± 0.40V
12	-12V	± 0.50V
14	+12V	± 0.50V
16	+20V	± 0.03V
22	+5V	± 0.40V

d. Adjust variable transformer for a voltage of 102V ± 2V AC and repeat step c.

e. Adjust variable transformer for a voltage of 129V ± 2V AC and repeat step c. Remove variable voltage transformer and reconnect instrument to the AC source.

2.20 CRT Alignment and Control

a. Adjust INTENSITY control to mid range. Set SENSITIVITY to 1 dB/DIV, set SWEEP switch to CONT, set LEVELMETER switch to SWEEP, and adjust VERTICAL POSITION control to set the trace on the center horizontal graticule line.

b. If the trace does not line up horizontally with the graticule line, turn off AC power and loosen clamp on neck of CRT.

CAUTION

High voltages are present at the socket of the CRT and on the High Voltage Supply board, 3000.

c. Turn on the AC power and carefully turn the CRT until the trace lines up. Turn off the AC power and tighten the clamp on the CRT neck. Turn on AC power.

d. Turn the INTENSITY control to the nine o'clock position. Trace should be just visible. Adjust INT control R3009 if necessary.

2.21 High Voltage Power Supply Adjust

a. Turn off AC power. Elevate High Voltage/Deflection Amplifier board, 3000, on extender. (Use extender from CE-70).

CAUTION

High voltages are present in this board.

b. Connect a probe to the collector of either Q2 or Q6 (Figure 3-15) and connect other end of probe to the counter. Turn on AC power. Frequency should be 14.55 kHz ± 50 Hz. Adjust R2 if necessary. Turn off AC and remove probe.

c. Use high voltage probe to connect DMM to board pin 12. Turn on AC power. Voltage should be +250V ± 5V DC. Adjust R32 (28V) control if necessary. Turn off AC power and remove probe.

d. Turn INTENSITY control fully CCW and set SWEEP switch to MANUAL. Connect high voltage probe to board pin 20. Turn on AC power. Voltage should be -2100V ± 200V DC. Turn off AC power.

e. Connect the high voltage probe to board pin 22. Turn on AC power. Voltage should be -2000V ± 200V DC. Turn off AC power and disconnect probe. Remove extender and replace 3000 board.

2.22 Horizontal Deflection Adjustment

a. Turn on AC power. Set SWEEP switch to CONT, set INTENSITY to 12 o'clock

or a comfortable viewing level, set HORIZONTAL POSITION control to mid range.

b. Adjust R3045 (GAIN) and R3053 (H CENT) see Figure 3-4, until trace is horizontally centered on the graticule.

c. Set SWEEP switch to MANUAL. Adjust the HORIZONTAL POSITION control until the voltage at J2015-9 is +1.00V ± .02V.

d. Adjust R3045 (H GAIN) until the dot is on the -5f line (left hand line of graticule).

2.23 80 kHz Bandpass Filter Level Adjust

a. Set CE-72 TUNING to EXT. Set Level to 0 dBm. Set CE-70 Frequency to 1 MHz and set Level to -20 dBm.

b. Set the CE-71 LEVELMETER switch to SWEEP, set SIG GEN to SWEEP, set SENSITIVITY to 1 dB/DIV, set HORIZONTAL to 6 kHz/DIV, set MARKER to OFF and set SWEEP to CONT.

c. Adjust the VERTICAL POSITION control to position the trace on the +10 dB line.

d. Turn the SIG GEN switch to MANUAL. There should be a signal that peaks to within 1.0 dB of the level of the trace observed in step c. If it is not within this limit the 80 kHz Bandpass Filter, 2600, must be realigned. This must be done only by the factory customer service or by a service center.

e. Set SIG GEN to SWEEP and HORIZONTAL to 0.4 kHz/DIV. Adjust R2611 (4 kHz), Figure 3-11, control to bring trace to the +10 dB line. Set SIG GEN to MANUAL. Signal should peak within 1.0 dB of +10 dB line.

f. Set SIG GEN switch to SWEEP, set HORIZONTAL to 30 kHz/DIV. Adjust R2620 (300 kHz) to set trace on +10 dB line. Set SIG GEN to MANUAL. Signal should peak within 1 dB of +10 dB line.

g. Set SIG GEN switch to SWEEP, set HORIZONTAL to 300 kHz/DIV. Adjust R2627 (3 MHz) to set the trace on the +10 dB line. Set SIG GEN to MANUAL. Signal should peak within 1 dB of 10 dB line.

h. Set SIG GEN switch to SWEEP, set HORIZONTAL to 1000 kHz/DIV. Adjust R2632 (10 MHz) to set trace on +10 dB line. Set SIG GEN to MANUAL. Signal should peak within 1 dB of +10 dB line.

i. Set SIG GEN to SWEEP, set HORIZONTAL to 2500 kHz/DIV. Adjust R2637 (25 MHz) to set trace on +10 dB line. Set SIG GEN to MANUAL. Signal should peak within 1 dB of +10 dB line.

2.24 Log Amplifier and Vertical Deflection Adjustment

a. Set the VERTICAL SENSITIVITY to 10 dB/DIV, set SIG GEN switch to SWEEP. Set the CE-70 Level to -40 dBm and set the CE-72 Level to -60 dBm.

b. Set the trace to the -20 dB graticule line with the CE-71 CAL control.

c. Step the CE-72 Level up in 10 dB steps to 0 dBm. The CE-71 display should step up from the -20 dB line to the +40 dB line, ± 2 dB, in 10 dB steps ± 1.0 dB.

d. If the overall gain is incorrect and the change is gradual over the whole range, adjust R3055 (V GAIN) to correct.

e. If only certain sections of the range are incorrect adjust the appropriate control for that section of the range, R2209 (ATTEN) R2224 (30 dB) or R2238 (60 dB). See Figures 3-4, 3-6.

f. Set the CE-72 Level to -40 dBm. Set the CE-71 CAL control to the 12 o'clock position. Adjust R3092 (V CENT) to position the trace on the 0 dB graticule line.

g. Turn the CAL control from fully CCW to fully CW. Trace should go from below the -10 dB line to above the +10 dB line.

h. Set the VERTICAL SENSITIVITY to 1 dB/DIV. Adjust the CE-72 Level and the CE-71 VERTICAL POSITION controls until the trace is on the -20 dB line. Step the CE-72 up in 1 dB steps. The CE-71 display should go up in 1 dB steps ± 0.3 dB.

2.25 LC/RC Oscillator Circuit Adjust

a. Set the CE-71 SWEEP switch to MANUAL and set the spot to the center graticule line with the TUNE control.

b. Connect the DMM to J2007-6 and adjust the HORIZONTAL POSITION control until the DMM reads 0.0V ± 0.1V DC.

c. Connect the counter to J2007-21. Frequency should be 500 kHz ± 1 kHz. Adjust R2471 (RCO) for this frequency if necessary.

d. Set HORIZONTAL to 0.4 kHz/DIV. Set the dot to the center of the graticule by adjusting the TUNE control. Connect the DMM to J2007-7 and adjust the HORIZONTAL POSITION control for a DMM reading of 0.0V ± 0.1V DC.

e. Connect the counter to J2007-21. Counter should read 500 kHz ± 0.1 kHz. If adjustment is necessary turn off instrument and put 2400 board on an ex-

tender (use extender from CE-70), turn on instrument and adjust L2411 for the correct frequency. Replace 2400 board in instrument.

f. Set the CE-71 SWEEP switch to CONT and SIG GEN switch to MANUAL. Set the CE-70 and the CE-72 Frequency to 1000 kHz.

g. Adjust the CE-71 HORIZONTAL POSITION control to place the spot on the center vertical graticule line. Then tune the CE-70 to 1002 kHz. The spot should be on the far left graticule line ± 0.1 DIV. Adjust R2496 (4 kHz) if necessary to bring spot to the line.

h. Tune the CE-70 to 1000 kHz. The spot should be on the center graticule line. Set the HORIZONTAL switch to 6 kHz/DIV. The spot should be within 0.4 DIV of the center graticule line. Adjust HORIZONTAL POSITION control to bring spot to center line.

i. Tune the CE-70 to 1030 kHz. The spot should be on the far left graticule line. Adjust R2466 (60 kHz) if necessary to bring spot to the line.

j. Tune the CE-70 back to 1000 kHz. Set the HORIZONTAL switch to 30 kHz/DIV. Bring the spot to the center line with the HORIZONTAL POSITION control.

k. Tune the CE-70 to 1150 kHz. The spot should be within 0.1 DIV of the far left graticule line. Adjust R2465 (300 kHz) to bring the spot to the line.

2.26 Steering Voltage Adjust

a. Connect the DMM to J2006-20. Tune the CE-70 to 0.0 kHz and note the voltage reading on the DMM.

b. Tune the CE-70 to 20 MHz. The voltage on the DMM should read 4.00V ± 0.02V higher than the previous voltage noted. Adjust R2450 (GAIN) until the voltage difference between the CE-70 settings of 0 and 20 MHz is 4.00V ± 0.02V DC.

c. Tune the CE-70 to 0.0 MHz. The DMM should read 0.0V ± 0.02V DC. Adjust R2452 (OS) if necessary.

2.27 Frequency Sweep Adjustment

a. Set the CE-72 TUNE to INT and set the Frequency to 5.0 MHz. Tune the CE-70 to 5.0 MHz.

b. Elevate the CE-71 2500 board and connect all board cables. Set the HORIZONTAL switch to 300 kHz/DIV. Adjust the HORIZONTAL POSITION switch until the spot is on the graticule center line.

c. Tune the CE-72 to 3.5 MHz. The spot should be within 0.1 DIV of the far left graticule line. Adjust R25115 (3M) if necessary.

d. Set the HORIZONTAL switch to 1000 kHz/DIV. Tune the CE-72 to 5.0 MHz. Adjust HORIZONTAL POSITION control to bring spot to center line.

e. Tune the CE-72 to 0.0 MHz. The spot should be within 0.1 DIV of the far left graticule line. Adjust R25114 (10M) if necessary.

f. Tune the CE-70 and CE-72 to 12.5 MHz. Set the HORIZONTAL switch to 2500 kHz/DIV. Adjust HORIZONTAL POSITION control to bring spot to the center line.

g. Tune the CE-72 to 0.0 MHz. The spot should be within 0.1 DIV of the far left graticule line. Adjust R25113 (25M) if necessary.

2.28 Carry out the Performance Check procedures, paragraphs 2.04-2.16.

Repair Service

2.29 In the event that repair is required contact:

Cushman Electronics, Inc.
Customer Service Department
2450 N. First St.
San Jose, California 95131
Telephone: (408) 263-8100
TWX: 910-338-0556

2.30 Cushman Electronics repair service is also available at the following service centers:

Regional Service Centers

B.C.S. Associates, Inc.
940 North Fern Creek Avenue
Orlando, Florida 32803
Telephone: (305) 896-4881
TWX: 810-850-0185

B.C.S. Associates, Inc.
1310 Beaman Place
Greensboro, North Carolina 27408
Telephone: (919) 273-1918
TWX: 510-925-1173

Reshal Associates, Inc.
219 West University Drive
Arlington Heights, Illinois 60004
Telephone: (312) 398-7660
TWX: 910-687-2824

International Service Centers

Dana Electronics, Ltd.
112, Collingdon Street
Luton, Bedfordshire, England
TELEX: 851-82430

Tele-Radio Systems, Ltd.
301 Supertest Road
Downsview P.O.
Toronto, Ontario, Canada M3J 2M4
Telephone: (416) 661-3221
TWX: 710-492-2384

Preparation for Reshipment

2.31 It is recommended that the shipping box and foam packing be kept in case it becomes necessary to return the instrument to the factory or service center for service or repair.

2.32 The following paragraphs contain a general guide for repackaging of the instrument for shipment.

a. Attach a tag to the instrument identifying the owner, and indicate the service or repair to be made. Include the model number and full serial number of the instrument. In any correspondence, identify the instrument by model and serial number.

b. Place the instrument in the original container. Make certain that the container is well sealed with strong tape.

c. If the original container is not used, wrap the instrument in plastic or heavy paper before placing in an inner container.

d. Place packing material around all sides of the instrument.

e. Place the instrument and inner container in a heavy carton and seal with strong tape.

f. Mark the shipping container: "DELICATE ELECTRONIC INSTRUMENT", "FRAGILE".

TROUBLESHOOTING

2.33 When trouble is experienced make certain that it is not caused by conditions external to the instrument. Check the following items:

a. Make certain that AC power is available at the AC receptacle to which the power cord is connected.

b. Turn SCALE illumination control fully CW. If screen is not illuminated check fuses, AC cord and AC source.

c. Make certain that all controls are in the proper position for the use to be made of the instrument.

d. Be sure that connections on the rear panel are properly made according to the connection diagram, Figure 2-1.

e. Be certain that input signal to the CE-70 is plugged into the proper input jack.

f. Check output of Low and High Voltage power supplies according to paragraphs 2.19 and 2.21.

g. Use the Troubleshooting Chart, Table 2-1, to localize the trouble in the instrument.

h. If a component is replaced carry out the Performance Check procedures, paragraphs 2.04 to 2.16. If necessary make the necessary adjustments according to paragraphs 2.17 to 2.27.

i. More information and assistance in troubleshooting may be obtained by a call to the Cushman Electronics Customer Service Department. See paragraph 2.29.

j. If a board or the complete instrument is to be shipped for repair, always contact the Cushman Electronics Customer Service Department before shipping, see paragraphs 2.29-2.32.

Table 2-1. Troubleshooting Chart

INDICATION	POSSIBLE CAUSE	CHECK
No trace on CRT	Intensity control not turned far enough CW	Turn INTENSITY control CW until trace appears
	LEVELMETER switch in MANUAL position	Turn switch to SWEEP position
	SWEEP switch in SINGLE or MANUAL position	Turn switch to CONT position
	No high voltage	High Voltage supply, para. 2.17
	Blanking circuits not unblanked	Blanking Amplifier, 3000 board or Blanking Enable Gates, 2100 board
	Defective CRT	Replace CRT
Stationary spot on either side of CRT	Horizontal deflection	Horizontal Amplifier, 3200 board for output
	Sweep Generator	Ramp Generator output, 2700 board
	Variable Oscillator, Slave	Output from boards or Meter phase lock loop, 2300, 2400, 2500
Stationary spot on CRT screen	SWEEP switch in MANUAL position	Turn switch to CONT position
No vertical deflection	No 80 kHz input from CE-70	80 kHz at P2601-13, 2600 board
	80 kHz bandpass filter	80 kHz output at P2601-16
	Logarithmic Amplifier	80 kHz output at P2201-12
	Low Voltage power supply	DC outputs from 2900 board
No Marker	Marker Oscillator circuits	Marker pulse at P3001-11

SECTION 3
PARTS LISTS AND SCHEMATIC DIAGRAMS

INTRODUCTION

3.01 The following parts lists and schematic diagrams have been arranged in order according to the Circuit Reference Series numbers. Refer to paragraphs 1.02-1.04. Each schematic diagram and parts list is identified with this number. The circuit boards in the instrument are marked with an identifying Assembly Number. The PC Board number is etched on the board. See Cross Reference Table 3-1 below.

3.02 Parts list pages are grouped with the schematic diagrams to which they refer. Component identification drawings showing the location of the individual components on the circuit board are placed on the inner sheet of the schematic diagram to which they apply.

Table 3-1. Printed Circuit Board and Circuit Reference Number Cross Reference

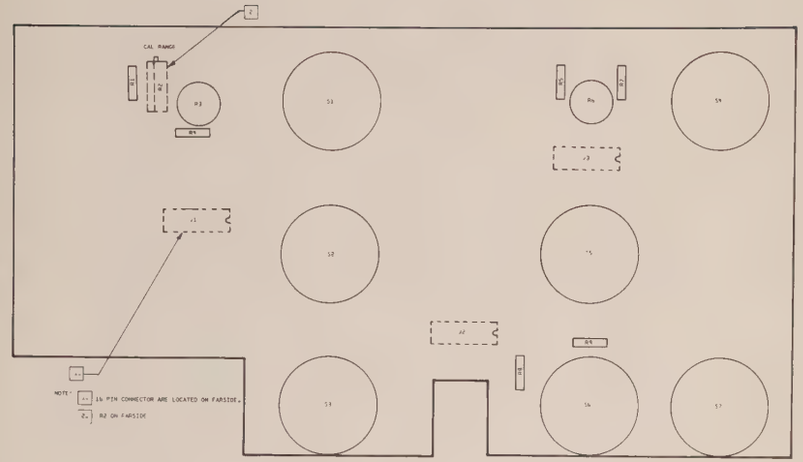
Ckt. Bd. No.	Circuit Title	Ckt. Ref. No.	Assembly No.	Figure No.	Page No.
1780-0567	80 kHz Bandpass Filter	2600	7001-0421	3-11	3-55
1780-0568	Logarithmic Amplifier	2200	7001-0417	3-6	3-23
1780-0569	Slave Phase Lock Loop	2500	7001-0420	3-10	3-49
1780-0570	Master Phase Lock Loop	2300	7001-0418	3-7	3-31
1780-0571	R. F. Switch	2800	7001-0423	3-13	3-69
1780-0572	Marker/Variable Oscillator	2400	7001-0419	3-8, 9	3-39, 41
1780-0573	Switch Logic	2100	7001-0425	3-5	3-17
1780-0574	Sweep Generator	2700	7001-0422	3-12	3-61
1780-0575	Low Voltage Power Supply	2900	7001-0424	3-14	3-73
1780-0576	Switch Mounting	1000/1100	7001-0426	3-1	3-5
1780-0577	Main Chassis	2000	7001-0428	3-2, 3, 4	3-9, 11, 13
1780-0578	H. V. Power Supply/Deflection Amplifier	3000	7001-0427	3-15, 16	3-81, 83
	Front Panel	1000	7003-0116	3-1	3-5
	Rear Panel	4000	7003-0117	3-17	3-87

FRONT PANEL, 1000

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
1000	PNL Assy, Front	7003-0116	Cushman	
	DIODE			
CR1	Dio, Light Emitting 5V Yel Crtg	1281-0092	Dialco	507-4957-3333-500
	RESISTORS			
R1	Pot, 5K, 10%, 2W Lin Taper Cer	1203-0088	CTS Berne	WL60527-551
R2	Pot, 2 Meg, 10%, 2W Lin Taper Cer	1203-0090	CTS Berne	WL60599-551
R3	Pot, 100K, 10%, 2W Lin Taper Cer	1203-0089	CTS Berne	WL60528-551
R4	Pot, 500 Ohm, 10%, 2W Lin Taper	1203-0087	CTS Berne	WL60526-551
R5	Pot, 10K, 20%, .75W Crmt Lin 5 Turn	1203-0080	CTS Berne	X6P1313-VA305
R6	Pot, 10K, 20%, .75W Crmt Lin 5 Turn	1203-0080	CTS Berne	X6P1313-VA305
	SWITCHES			
S1	Sw, SPST w/Red Incandescent Lens	1852-0014	Drake	7077-000-834
S2	Sw, SPST w/Red Incandescent Lens	1852-0014	Drake	7077-000-834
	SOCKET			
XCR1	Lphldr, Crtg Type Frmt Press Inblk	1965-0016	Eldema	DHP-65B

SWITCH MOUNTING, 1100

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
1100	PCB Assy, Switch Mounting	7001-0426	Cushman	
	PC Board	1780-0576	Cushman	
	RESISTORS			
R1	Res, 20K, 5%, 1/4W Comp	1066-2035	Allen-Bradley	CB2035
R2	Pot, 5K, 10%, 3/4W	1215-0012	Helitrim	89WR
R3	Pot, 1K, 10%, 1/2W Lin Taper PCB Mt	1203-0086	Allen-Bradley	WP2G032P102UZ
R4	Res, 22K, 5%, 1/4W Comp	1066-2235	Allen-Bradley	CB2235
R5	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025
R6	Pot, 10K, 10%, 1/2W Lin Taper PCB Mt	1203-0085	Allen-Bradley	WP2G032P103UZ
R7	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025
R8	Res, 27K, 5%, 1/4W Comp	1066-2735	Allen-Bradley	CB2735
R9	Res, 1.5K, 5%, 1/4W Comp	1066-1525	Allen-Bradley	CB1525
	SWITCHES			
S1	Sw, Rtry 3 Pole 2 Pos PCB Mt	1851-0109	Cushman	
S2	Sw, Rtry 3 Pole 2 Pos PCB Mt	1851-0109	Cushman	
S3	Sw, Rtry 3 Pole 2 Pos PCB Mt	1851-0109	Cushman	
S4	Sw, Rtry 1 Pole 6 Pos PCB Mt	1851-0110	Cushman	
S5	Sw, Rtry 1 Pole 3 Pos PCB Mt	1851-0111	Cushman	
S6	Sw, Rtry 3 Pole 2 Pos PCB Mt	1851-0109	Cushman	
S7	Sw, Rtry 3 Pole 2 Pos PCB Mt	1851-0109	Cushman	
	SOCKETS			
XQ1	Socket, 16 Pin Dual Inline IC	2606-0006	Cinch	133-51-20-006
XQ2	Socket, 16 Pin Dual Inline IC	2606-0006	Cinch	133-51-20-006
XQ3	Socket, 16 Pin Dual Inline IC	2606-0006	Cinch	133-51-20-006



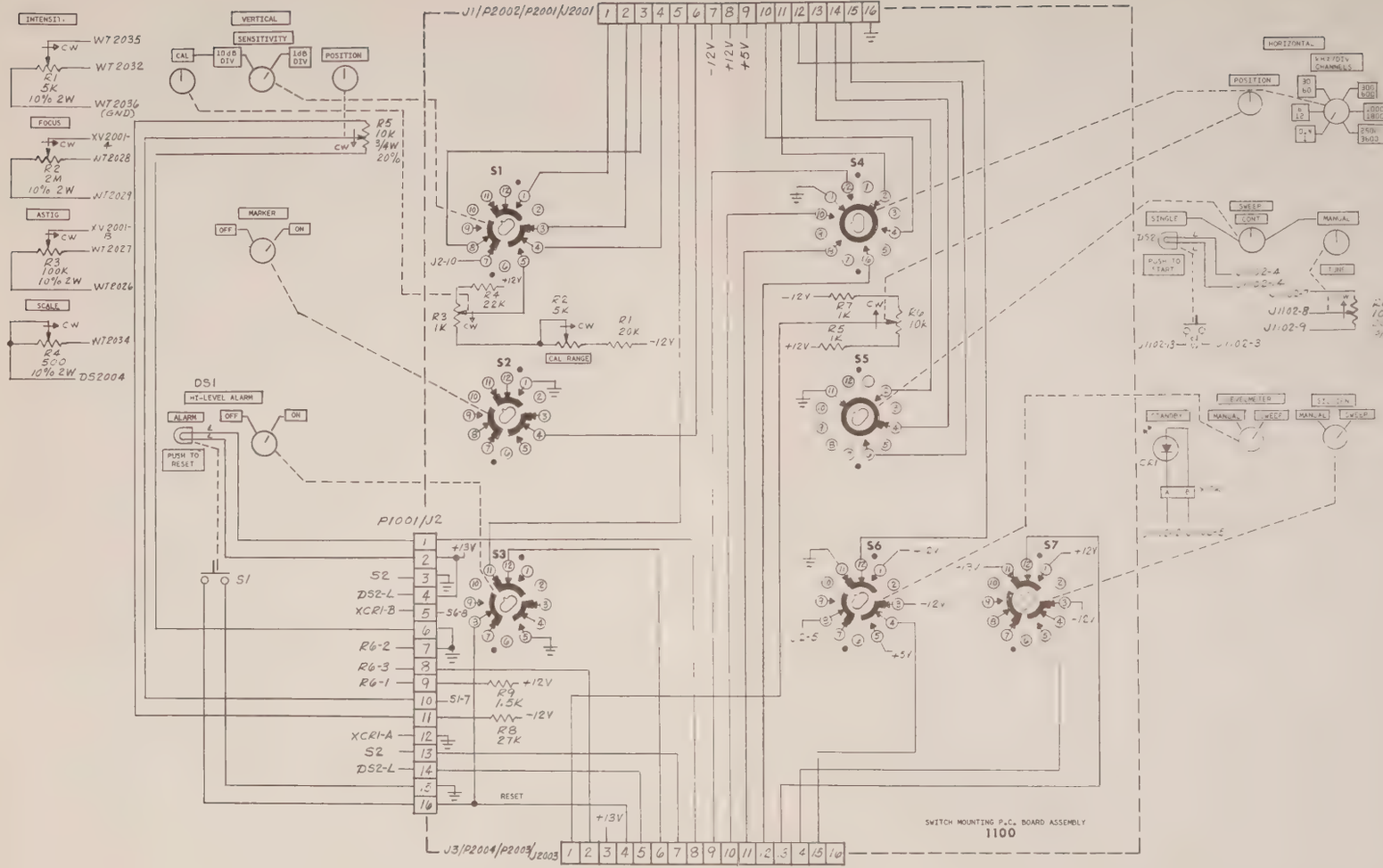


Figure 3-1. Front Panel Interconnection Diagram, Switch Mounting, 1000/1100

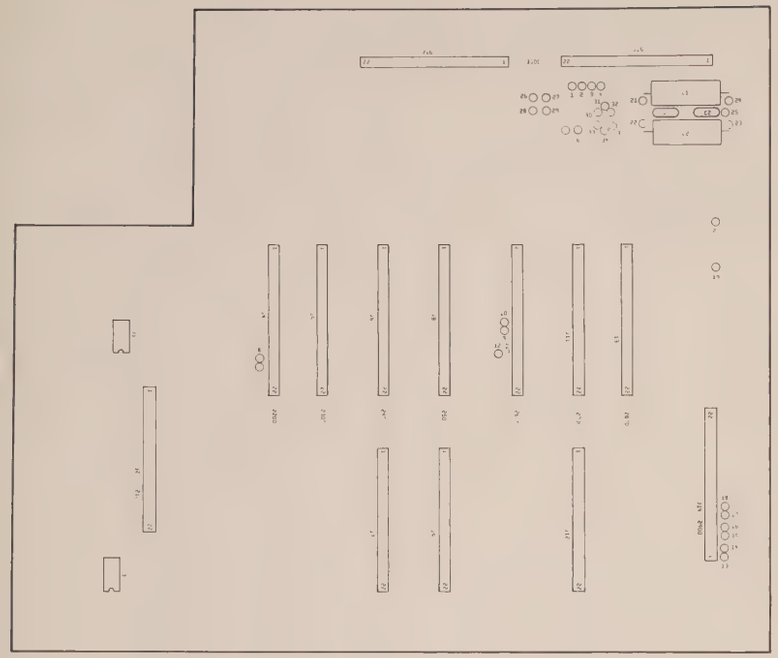
5601**0069

MAIN CHASSIS, 2000

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
2000	PCB Assy, Main Chassis	7001-0428	Cushman	
	PC Board	1780-0577	Cushman	
	CAPACITORS			
C1	Cap, 2200PF, 20%, 3K Disc	1005-0098	CPL	DD30222M
C2	Cap, 2200PF, 20%, 3K Disc	1005-0098	CPL	DD30222M
	FILTER			
FL1	Filter, 80 kHz/45 Hz	1040-0029	Cushman	
	LAMPS			
DS1	Lamp, #47	2870-0002	G.E.	47
DS2	Lamp, #47	2870-0002	G.E.	47
DS3	Lamp, #47	2870-0002	G.E.	47
DS4	Lamp, #47	2870-0002	G.E.	47
	CONNECTORS			
J1	Conn, 16 Pin Dual Inline IC	2606-0006	Cinch	133-51-20-006
J2	Conn, 44 Cont Dbl Row Dip Term PCB Jk	2535-0076	Amphenol	225-22221-103
J3	Conn, 16 Pin Dual Inline IC	2606-0006	Cinch	133-51-20-006
J4	Conn, 22 Cont Single Row	2535-0078	Amphenol	225-22251-104
J5	Conn, 22 Cont Single Row	2535-0078	Amphenol	225-22251-104
J6	Conn, 22 Cont Single Row	2535-0078	Amphenol	225-22251-104
J7	Conn, 22 Cont Single Row	2535-0078	Amphenol	225-22251-104
J8	Conn, 22 Cont Single Row	2535-0078	Amphenol	225-22251-104
J9	Conn, 22 Cont Single Row	2535-0078	Amphenol	225-22251-104
J10	Conn, 22 Cont Single Row	2535-0078	Amphenol	225-22251-104
J11	Conn, 22 Cont Single Row	2535-0078	Amphenol	225-22251-104
J12	Conn, 22 Cont Single Row	2535-0078	Amphenol	225-22251-104
J13	Conn, 22 Cont Single Row	2535-0078	Amphenol	225-22251-104
J14	Conn, 22 Cont Single Row	2535-0078	Amphenol	225-22251-104
J15	Conn, 22 Cont Single Row	2535-0078	Amphenol	225-22251-104
J16	Conn, 22 Cont Single Row	2535-0078	Amphenol	225-22251-104
	RELAY			
K1	Relay, DPDT 20V Can	1313-0008	Clare	FC1109F00
	INDUCTORS			
L1	Choke, 100μH, 20%, 2 Amp	1585-0040	Miller	5250
L2	Choke, 100μH, 20%, 2 Amp	1585-0040	Miller	5250
	RESISTOR			
R1	Res, 100K, 5%, 1/2W Comp	1067-1045	Allen-Bradley	EB1045
	TUBE			
V1	Tube, Round 5" Cathode Ray	1270-0020	Cushman	

MAIN CHASSIS, 2000 (cont)

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
	SOCKETS			
XDS1	Socket, Lamp	1965-0010	Leecraft	7-06
XDS2	Socket, Lamp	1965-0010	Leecraft	7-06
XDS3	Socket, Lamp	1965-0010	Leecraft	7-06
XDS4	Socket, Lamp	1965-0010	Leecraft	7-06
XV1	Socket, 12 Pin Tube	2605-0011	Cinch	3B12



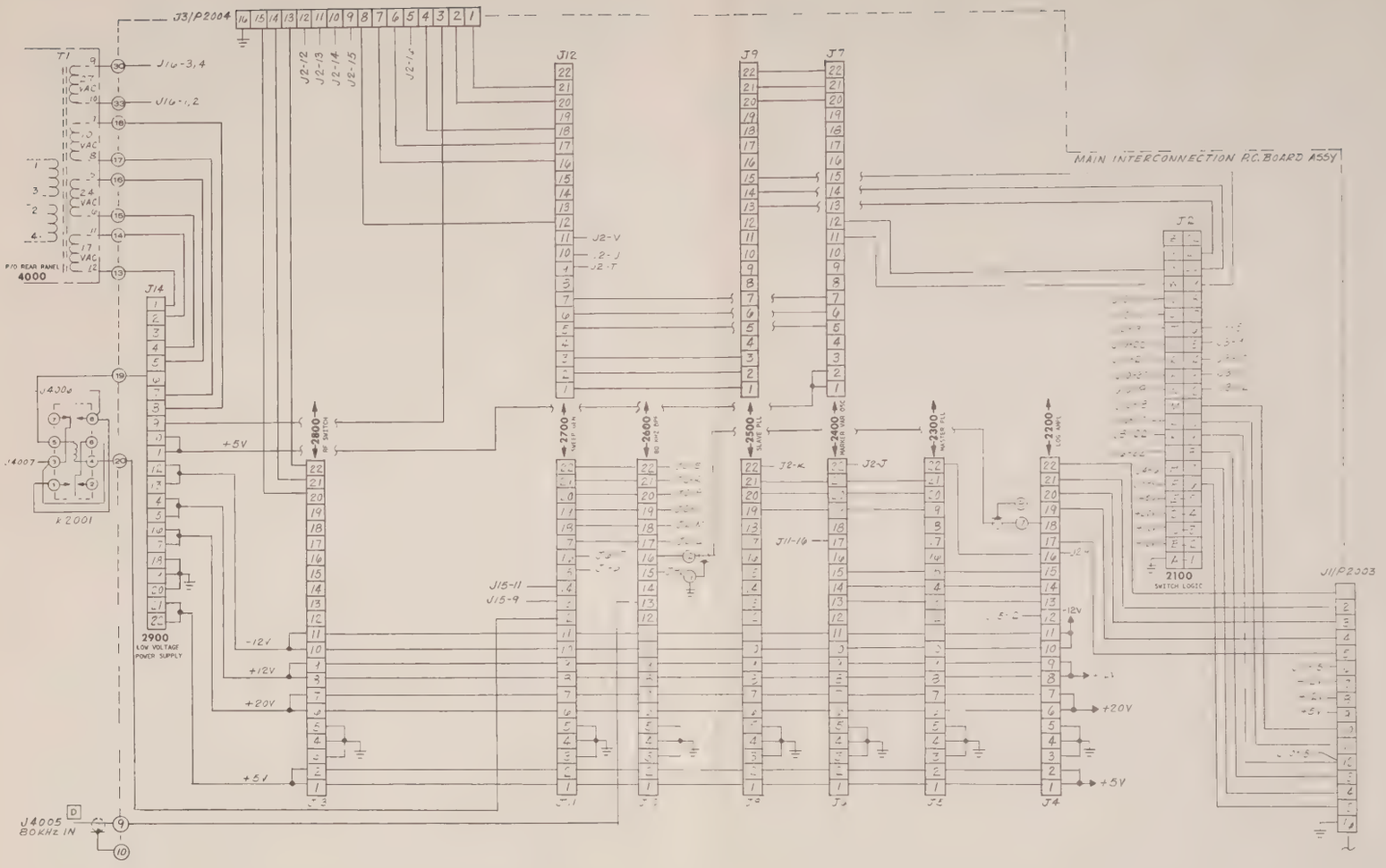


Figure 3-2. Main Chassis Interconnection Diagram, 2000, sheet 1

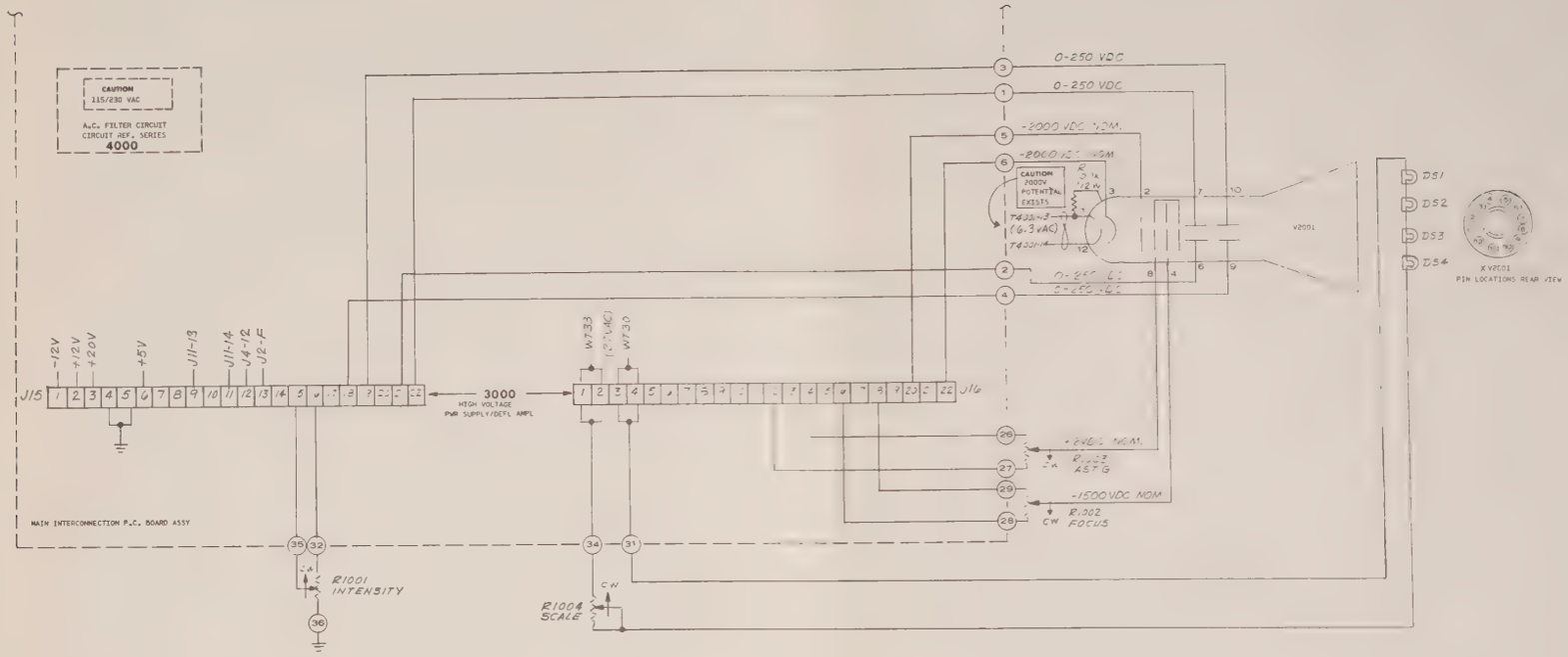
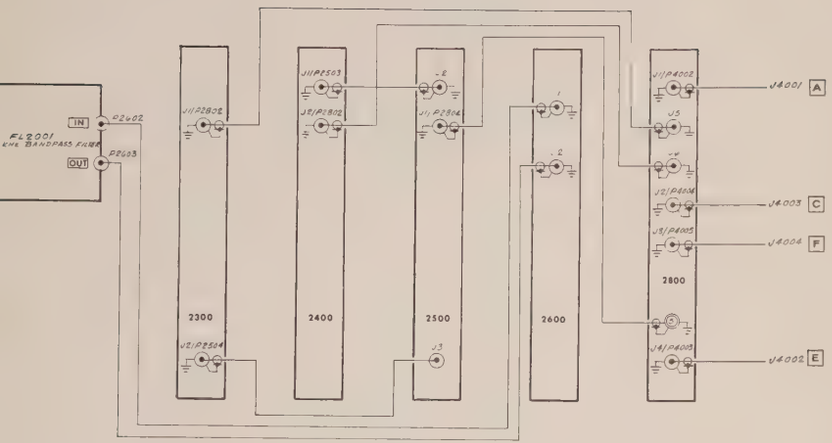


Figure 3-3. Main Chassis Interconnection Diagram, 2000, sheet 2



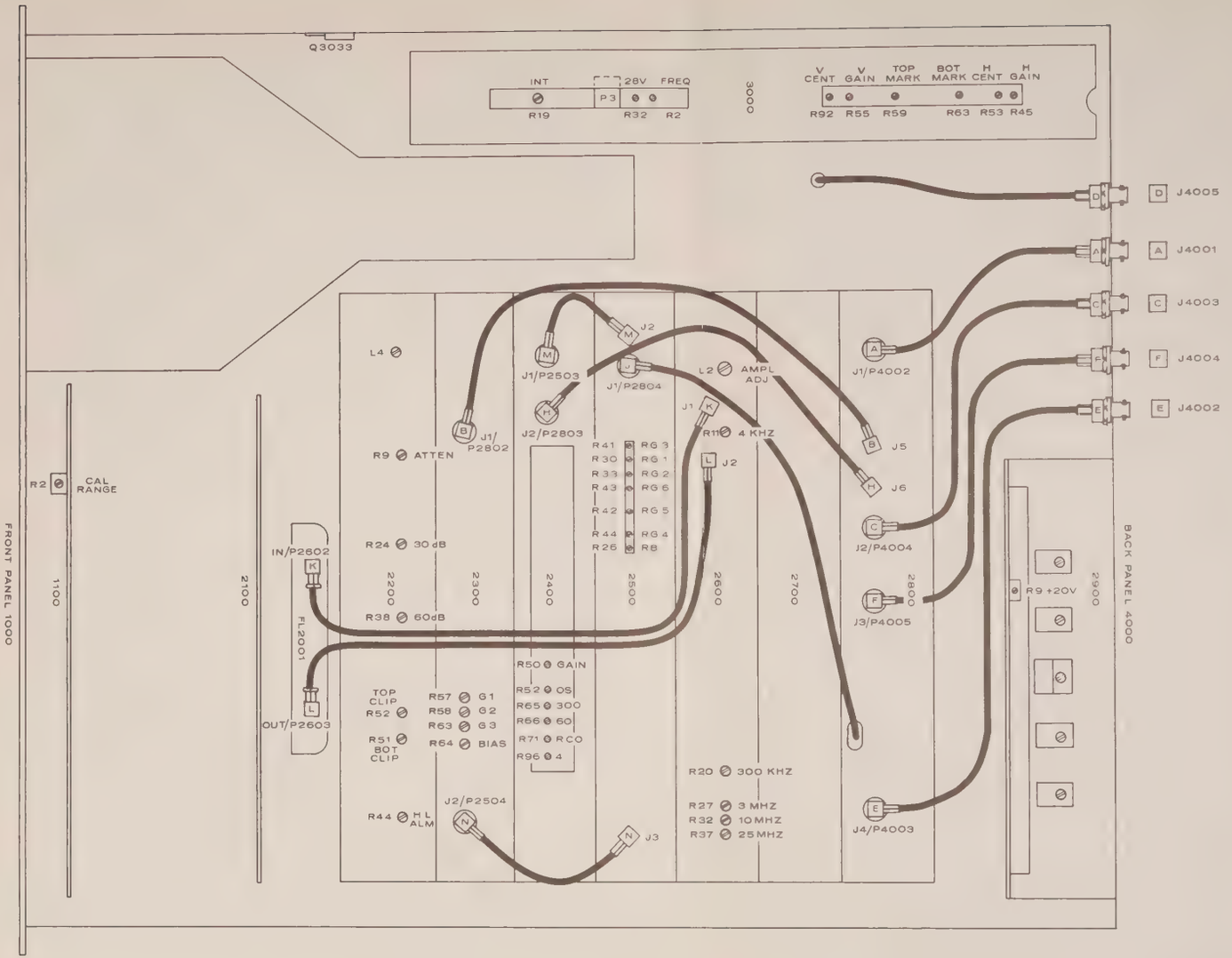


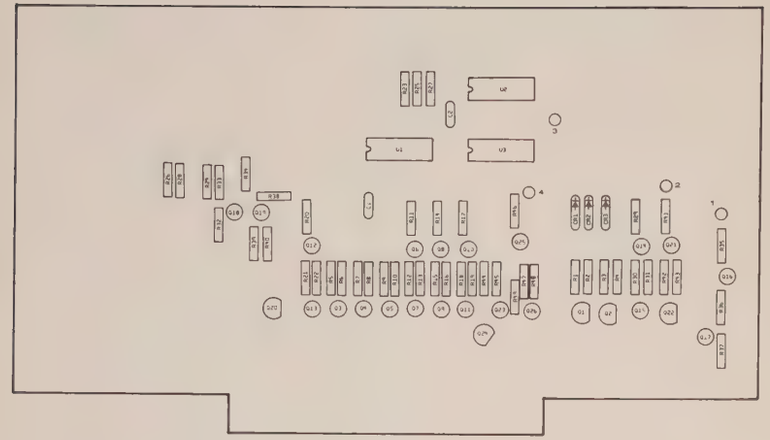
Figure 3-4. Main Chassis Interconnection Diagram, 2000, sheet 3

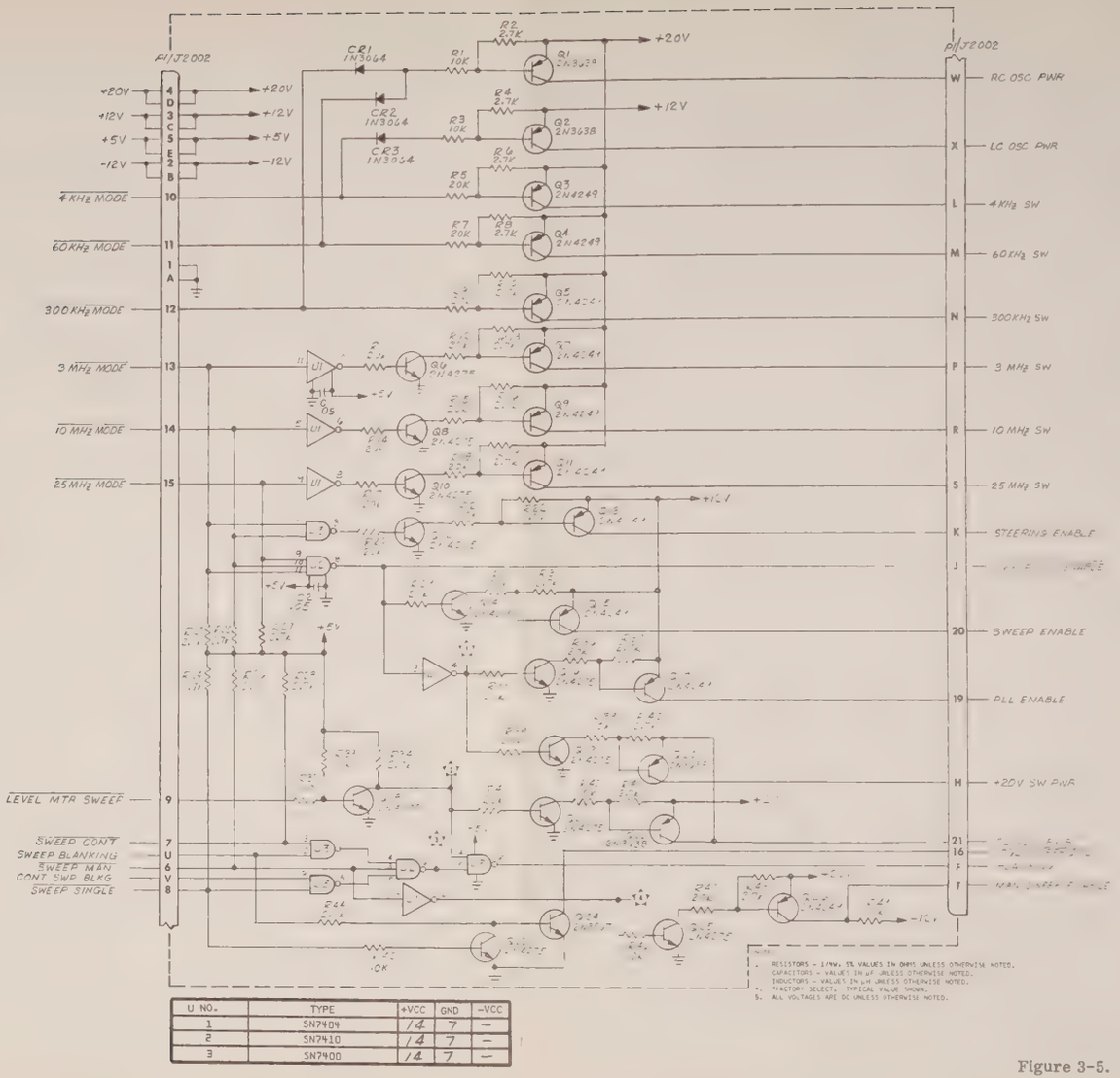
SWITCH LOGIC, 2100

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
2100	PCB Assy, Switch Logic	7001-0425	Cushman	
	PC Board	1780-0573	Cushman	
	CAPACITORS			
C1	Cap, .05μF, -80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C2	Cap, .05μF, -80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
	DIODES			
CR1	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR2	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR3	Diode, 1N3064	1281-0013	Teledyne	1N3064
	TRANSISTORS			
Q1	Trans, 2N3638	1272-0015	Fairchild	2N3638
Q2	Trans, 2N3638	1272-0015	Fairchild	2N3638
Q3	Trans, 2N4249	1272-0024	Fairchild	2N4249
Q4	Trans, 2N4249	1272-0024	Fairchild	2N4249
Q5	Trans, 2N4249	1272-0024	Fairchild	2N4249
Q6	Trans, 2N4275	1272-0016	Fairchild	2N4275
Q7	Trans, 2N4249	1272-0024	Fairchild	2N4249
Q8	Trans, 2N4275	1272-0016	Fairchild	2N4275
Q9	Trans, 2N4249	1272-0024	Fairchild	2N4249
Q10	Trans, 2N4275	1272-0016	Fairchild	2N4275
Q11	Trans, 2N4249	1272-0024	Fairchild	2N4249
Q12	Trans, 2N4275	1272-0016	Fairchild	2N4275
Q13	Trans, 2N4249	1272-0024	Fairchild	2N4249
Q14	Trans, 2N4275	1272-0016	Fairchild	2N4275
Q15	Trans, 2N4249	1272-0024	Fairchild	2N4249
Q16	Trans, 2N4275	1272-0016	Fairchild	2N4275
Q17	Trans, 2N4249	1272-0024	Fairchild	2N4249
Q18	Trans, 2N4275	1272-0016	Fairchild	2N4275
Q19	Trans, 2N4275	1272-0016	Fairchild	2N4275
Q20	Trans, 2N3638	1272-0015	Fairchild	2N3638
Q21	Trans, 2N4275	1272-0016	Fairchild	2N4275
Q22	Trans, 2N3638	1272-0015	Fairchild	2N3638
Q23	Trans, 2N4275	1272-0016	Fairchild	2N4275
Q24	Trans, 2N3567	1272-0014	Fairchild	2N3567
Q25	Trans, 2N4275	1272-0016	Fairchild	2N4275
Q26	Trans, 2N4249	1272-0024	Fairchild	2N4249
	RESISTORS			
R1	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R2	Res, 2.7K, 5%, 1/4W Comp	1066-2725	Allen-Bradley	CB2725
R3	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R4	Res, 2.7K, 5%, 1/4W Comp	1066-2725	Allen-Bradley	CB2725
R5	Res, 20K, 5%, 1/4W Comp	1066-2035	Allen-Bradley	CB2035
R6	Res, 2.7K, 5%, 1/4W Comp	1066-2725	Allen-Bradley	CB2725
R7	Res, 20K, 5%, 1/4W Comp	1066-2035	Allen-Bradley	CB2035
R8	Res, 2.7K, 5%, 1/4W Comp	1066-2725	Allen-Bradley	CB2725
R9	Res, 20K, 5%, 1/4W Comp	1066-2035	Allen-Bradley	CB2035
R10	Res, 2.7K, 5%, 1/4W Comp	1066-2725	Allen-Bradley	CB2725

SWITCH LOGIC, 2100 (cont)

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R11	Res, 20K, 5%, 1/4W Comp	1066-2035	Allen-Bradley	CB2035
R12	Res, 20K, 5%, 1/4W Comp	1066-2035	Allen-Bradley	CB2035
R13	Res, 2.7K, 5%, 1/4W Comp	1066-2725	Allen-Bradley	CB2725
R14	Res, 20K, 5%, 1/4W Comp	1066-2035	Allen-Bradley	CB2035
R15	Res, 20K, 5%, 1/4W Comp	1066-2035	Allen-Bradley	CB2035
R16	Res, 2.7K, 5%, 1/4W Comp	1066-2725	Allen-Bradley	CB2725
R17	Res, 20K, 5%, 1/4W Comp	1066-2035	Allen-Bradley	CB2035
R18	Res, 20K, 5%, 1/4W Comp	1066-2035	Allen-Bradley	CB2035
R19	Res, 2.7K, 5%, 1/4W Comp	1066-2725	Allen-Bradley	CB2725
R20	Res, 20K, 5%, 1/4W Comp	1066-2035	Allen-Bradley	CB2035
R21	Res, 20K, 5%, 1/4W Comp	1066-2035	Allen-Bradley	CB2035
R22	Res, 2.7K, 5%, 1/4W Comp	1066-2725	Allen-Bradley	CB2725
R23	Res, 2.7K, 5%, 1/4W Comp	1066-2725	Allen-Bradley	CB2725
R24	Res, 2.7K, 5%, 1/4W Comp	1066-2725	Allen-Bradley	CB2725
R25	Res, 2.7K, 5%, 1/4W Comp	1066-2725	Allen-Bradley	CB2725
R26	Res, 2.7K, 5%, 1/4W Comp	1066-2725	Allen-Bradley	CB2725
R27	Res, 2.7K, 5%, 1/4W Comp	1066-2725	Allen-Bradley	CB2725
R28	Res, 2.7K, 5%, 1/4W Comp	1066-2725	Allen-Bradley	CB2725
R29	Res, 20K, 5%, 1/4W Comp	1066-2035	Allen-Bradley	CB2035
R30	Res, 20K, 5%, 1/4W Comp	1066-2035	Allen-Bradley	CB2035
R31	Res, 2.7K, 5%, 1/4W Comp	1066-2725	Allen-Bradley	CB2725
R32	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R33	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R34	Res, 2.7K, 5%, 1/4W Comp	1066-2725	Allen-Bradley	CB2725
R35	Res, 20K, 5%, 1/4W Comp	1066-2035	Allen-Bradley	CB2035
R36	Res, 20K, 5%, 1/4W Comp	1066-2035	Allen-Bradley	CB2035
R37	Res, 2.7K, 5%, 1/4W Comp	1066-2725	Allen-Bradley	CB2725
R38	Res, 20K, 5%, 1/4W Comp	1066-2035	Allen-Bradley	CB2035
R39	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R40	Res, 2.7K, 5%, 1/4W Comp	1066-2725	Allen-Bradley	CB2725
R41	Res, 20K, 5%, 1/4W Comp	1066-2035	Allen-Bradley	CB2035
R42	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R43	Res, 2.7K, 5%, 1/4W Comp	1066-2725	Allen-Bradley	CB2725
R44	Res, 2.7K, 5%, 1/4W Comp	1066-2725	Allen-Bradley	CB2725
R45	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R46	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R47	Res, 20K, 5%, 1/4W Comp	1066-2035	Allen-Bradley	CB2035
R48	Res, 2.7K, 5%, 1/4W Comp	1066-2725	Allen-Bradley	CB2725
R49	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
	INTEGRATED CIRCUITS			
U1	IC, SN7404N, Hex Inverter	2025-0048	T.I.	SN7404N
U2	IC, SN7410N, Triple 3-Inpt Nand Gate	2025-0047	T.I.	SN7410N
U3	IC, SN7400N, TTL Nand Gate	2025-0003	T.I.	SN7400N





U NO.	TYPE	+VCC	GND	-VCC
1	SN7404	14	7	—
2	SN7410	14	7	—
3	SN7400	14	7	—

Figure 3-5. Switch Logic, 2100

5601**0069

LOGARITHMIC AMPLIFIER, 2200

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
2200	PCB Assy, Log Ampl	7001-0417	Cushman	
	PC Board	1780-0568	Cushman	
	CAPACITORS			
C1	Cap, 470μF, 25V	1014-0020	Ill. Cap.	25T470
C2	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C3	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C4	Cap, 3900PF, 5%, 500V Mica	1002-0079	Elmenco	DM19-F-393J
C5	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C6	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C7	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C8	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C9	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C10	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C11	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C12	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C13	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C14	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C15	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C16	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C17	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C18	Cap, 150PF, 5%, 500V Mica	1002-0021	Elmenco	DM15-F-151J
C19	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C20	Cap, 33PF, 5%, 500V Mica	1002-0024	Elmenco	DM15-E-330J
C21	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C22	Cap, .1μF, 10%, 100V	1008-0031	Sprague	225P10491WA3
C23	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C24	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C25	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C26	Cap, .1μF, 10%, 100V	1008-0031	Sprague	225P10491WA3
C27	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C28	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C29	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C30	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C31	Cap, 3.3PF, .25PF%, 500V Tub.	1005-0011	Erie	301-000-C0J0-339C
C32	Cap, .027μF, 10%, 100V	1008-0032	Sprague	225P27391WA3
C33	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C34	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C35	Cap, .1μF, 10%, 100V	1008-0031	Sprague	225P10491WA3
C36	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C37	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C38	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C39	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C40	Cap, .1μF, 10%, 100V	1008-0031	Sprague	225P10491WA3
C41	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C42	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C43	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C44	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C45	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20

LOGARITHMIC AMPLIFIER, 2200 (cont)

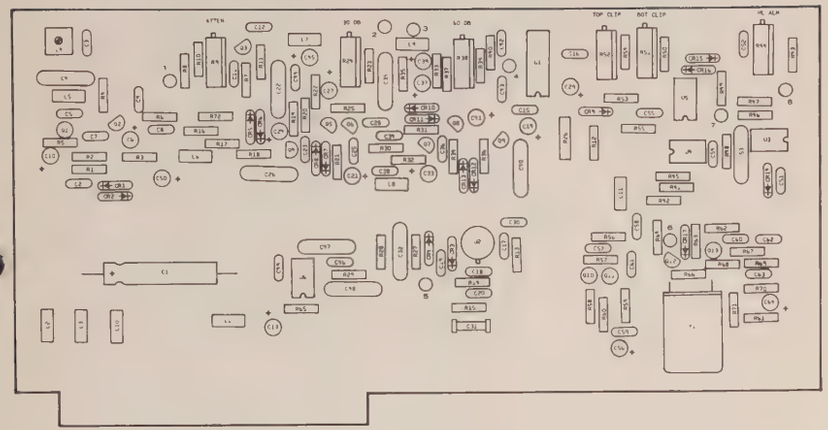
CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
C46	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C47	Cap, .039μF, 10%, 100V	1008-0045	Sprague	225P39391WA3
C48	Cap, 8200PF, 5%, 100V Mica	1002-0076	Elmenco	DM19-E-822J
C49	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C50	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C51	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C52	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C53	Cap, .0012μF, 10%, 100V	1008-0016	Sprague	225P12291WA3
C54	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C55	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C56	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C57	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C58	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C59	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C60	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C61	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C62	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C63	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C64	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
	DIODES			
CR1	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR2	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR3	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR4	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR5	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR6	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR7	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR8	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR9	Diode, 1N827	1281-0038	Motorola	1N827
CR10	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR11	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR12	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR13	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR14	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR15	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR16	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR17	Diode, 1N3064	1281-0013	Teledyne	1N3064
	INDUCTORS			
L1	Choke, 1000μH, 5%	1585-0020	Delevan	2500-28
L2	Choke, 1000μH, 5%	1585-0020	Delevan	2500-28
L3	Choke, 1000μH, 5%	1585-0020	Delevan	2500-28
L4	Coil, Variable	1596-0087	Cushman	
L5	Choke, 100μH, 5%	1585-0017	Delevan	1537-76
L6	Choke, 100μH, 5%	1585-0017	Delevan	1537-76
L7	Choke, 100μH, 5%	1585-0017	Delevan	1537-76
L8	Choke, 100μH, 5%	1585-0017	Delevan	1537-76
L9	Choke, 100μH, 5%	1585-0017	Delevan	1537-76
L10	Choke, 100μH, 5%	1585-0017	Delevan	1537-76
L11	Choke, 1000μH, 5%	1585-0020	Delevan	2500-28

LOGARITHMIC AMPLIFIER, 2200 (cont)

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
	TRANSISTORS			
Q1	Trans, 2N3565	1272-0017	Fairchild	2N3565
Q2	Trans, 2N5962	1272-0059	Fairchild	2N5962
Q3	Trans, 2N5962	1272-0059	Fairchild	2N5962
Q4	Trans, 2N5962	1272-0059	Fairchild	2N5962
Q5	Trans, 2N5962	1272-0059	Fairchild	2N5962
Q6	Trans, 2N5962	1272-0059	Fairchild	2N5962
Q7	Trans, 2N5962	1272-0059	Fairchild	2N5962
Q8	Trans, 2N5962	1272-0059	Fairchild	2N5962
Q9	Trans, 2N5962	1272-0059	Fairchild	2N5962
Q10	Trans, 2N4275	1272-0016	Fairchild	2N4275
Q11	Trans, 2N4275	1272-0016	Fairchild	2N4275
Q12	Trans, 2N3906	1272-0037	Motorola	2N3906
Q13	Trans, 2N3565	1272-0017	Fairchild	2N3565
	RESISTORS			
R1	Res, 619 Ohm, 1%, 1/8W MF	1075-0063	Dale	MF 1/8
R2	Res, 1K, 1%, 1/8W MF	1075-0037	Dale	MF 1/8
R3	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R4	Res, 5.62K, 1%, 1/8W MF	1075-0013	Dale	MF 1/8
R5	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025
R6	Res, 1.2K, 5%, 1/4W Comp	1066-1225	Allen-Bradley	CB1225
R7	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025
R8	Res, 15K, 1%, 1/8W MF	1075-0081	Dale	MF 1/8
R9	Pot, 1K, 10%, 3/4W	1215-0013	Helitrim	89WR
R10	Res, 174 Ohm, 1%, 1/8W MF	1075-0036	Dale	MF 1/8
R11	Res, 1.2K, 5%, 1/4W Comp	1066-1225	Allen-Bradley	CB1225
R12	Res, 2.21K, 1%, 1/8W MF	1075-0010	Dale	MF 1/8
R13	Res, 22K, 5%, 1/4W Comp	1066-2235	Allen-Bradley	CB2235
R14	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025
R15	Res, 22.1K, 1%, 1/8W MF	1075-0012	Dale	MF 1/8
R16	Res, 22K, 5%, 1/4W Comp	1066-2235	Allen-Bradley	CB2235
R17	Res, 2.2K, 5%, 1/4W Comp	1066-2225	Allen-Bradley	CB2225
R18	Res, 1.21K, 1%, 1/8W MF	1075-0042	Dale	MF 1/8
R19	Res, 1.2K, 5%, 1/4W Comp	1066-1225	Allen-Bradley	CB1225
R20	Res, 22K, 5%, 1/4W Comp	1066-2235	Allen-Bradley	CB2235
R21	Res, 1K, 1%, 1/8W MF	1075-0037	Dale	MF 1/8
R22	Res, 1.21K, 1%, 1/8W MF	1075-0042	Dale	MF 1/8
R23	Res, 174 Ohm, 1%, 1/8W MF	1075-0036	Dale	MF 1/8
R24	Pot, 1K, 10%, 3/4W	1215-0013	Helitrim	89WR
R25	Res, 2.2K, 5%, 1/4W Comp	1066-2225	Allen-Bradley	CB2225
R26	Res, 357 Ohm, 1%, 1/2W MF	1076-0012	Dale	MF 1/8
R27	Res, 1K, 1%, 1/8W MF	1075-0037	Dale	MF 1/8
R28	Res, 1K, 1%, 1/8W MF	1075-0037	Dale	MF 1/8
R29	Res, 1K, 1%, 1/8W MF	1075-0037	Dale	MF 1/8
R30	Res, 22K, 5%, 1/4W Comp	1066-2235	Allen-Bradley	CB2235
R31	Res, 2.2K, 5%, 1/4W Comp	1066-2225	Allen-Bradley	CB2225
R32	Res, 1.21K, 1%, 1/8W MF	1075-0042	Dale	MF 1/8
R33	Res, 1.2K, 5%, 1/4W Comp	1066-1225	Allen-Bradley	CB1225
R34	Res, 22K, 5%, 1/4W Comp	1066-2235	Allen-Bradley	CB2235
R35	Res, 121 Ohm, 1%, 1/10W MF	1075-0006	Dale	MF 1/8

LOGARITHMIC AMPLIFIER, 2200 (cont)

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R36	Res, 1K, 1%, 1/8W MF	1075-0037	Dale	MF 1/8
R37	Res, 1.21K, 1%, 1/8W MF	1075-0042	Dale	MF 1/8
R38	Pot, 1K, 10%, 3/4W	1215-0013	Helitrim	89WR
R39	Res, 174 Ohm, 1%, 1/8W MF	1075-0036	Dale	MF 1/8
R40	Res, 2.2K, 5%, 1/4W Comp	1066-2225	Allen-Bradley	CB2225
R41	Res, 1K, 1%, 1/8W MF	1075-0037	Dale	MF 1/8
R42	Res, 10K, 1%, 1/8W MF	1075-0009	Dale	MF 1/8
R43	Res, 10K, 1%, 1/8W MF	1075-0009	Dale	MF 1/8
R44	Pot, 1K, 10%, 3/4W	1215-0013	Helitrim	89WR
R45	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025
R46	Res, 4.75K, 1%, 1/8W MF	1075-0038	Dale	MF 1/8
R47	Res, 1K, 1%, 1/8W MF	1075-0037	Dale	MF 1/8
R48	Res, 33.3K, 1%, 1/8W MF	1075-0072	Dale	MF 1/8
R49	Res, 100K, 5%, 1/4W Carbon Comp	1066-1045	Allen-Bradley	CB1045
R50	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R51	Pot, 2K, 10%, 3/4W	1215-0015	Beckman	89WR2K
R52	Pot, 5K, 10%, 3/4W	1215-0012	Helitrim	89WR
R53	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025
R54	Res, 4.3K, 5%, 1/4W Comp	1066-4325	Allen-Bradley	CB4325
R55	Res, 1.5K, 5%, 1/4W Comp	1066-1525	Allen-Bradley	CB1525
R56	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025
R57	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025
R58	Res, 1.5K, 5%, 1/4W Comp	1066-1525	Allen-Bradley	CB1525
R59	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025
R60	Res, 5.1 Ohm, 5%, 1/4W Comp	1066-0002	Allen-Bradley	CB0002
R61	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R62	Res, 1.5K, 5%, 1/4W Comp	1066-1525	Allen-Bradley	CB1525
R63	Res, 33 Ohm, 5%, 1/4W Comp	1066-3305	Allen-Bradley	CB3305
R64	Res, 680 Ohm, 5%, 1/4W Comp	1066-6815	Allen-Bradley	CB6815
R65	Res, 3K, 5%, 1/4W Comp	1066-3025	Allen-Bradley	CB3025
R66	Res, 150 Ohm, 5%, 1/4W Comp	1066-1515	Allen-Bradley	CB1515
R67	Res, 1.5K, 5%, 1/4W Comp	1066-1525	Allen-Bradley	CB1525
R68	Res, 270 Ohm, 5%, 1/4W Comp	1066-2715	Allen-Bradley	CB2715
R69	Res, 470 Ohm, 5%, 1/4W Comp	1066-4715	Allen-Bradley	CB4715
R70	Res, 27K, 5%, 1/4W Comp	1066-2735	Allen-Bradley	CB2735
R71	Res, 8.2K, 5%, 1/4W Comp	1066-8225	Allen-Bradley	CB8225
R72	Res, 121 Ohm, 1%, 1/10W MF	1075-0006	Dale	MF 1/8
	INTEGRATED CIRCUITS			
U1	IC, SN76502, Logarithmic Amp	2025-0049	T.I.	SN76502
U2	IC, LM301A, Op Amp	2025-0032	National	LM301A
U3	IC, SN72741P	2025-0067	T.I.	SN72741P
U4	IC, SN72741P	2025-0067	T.I.	SN72741P
U5	IC, SN72741P	2025-0067	T.I.	SN72741P
U6	IC, SN72741P	2025-0067	T.I.	SN72741P
	CRYSTAL			
Y1	Xtal, 500 kHz	2035-0019	Cushman	



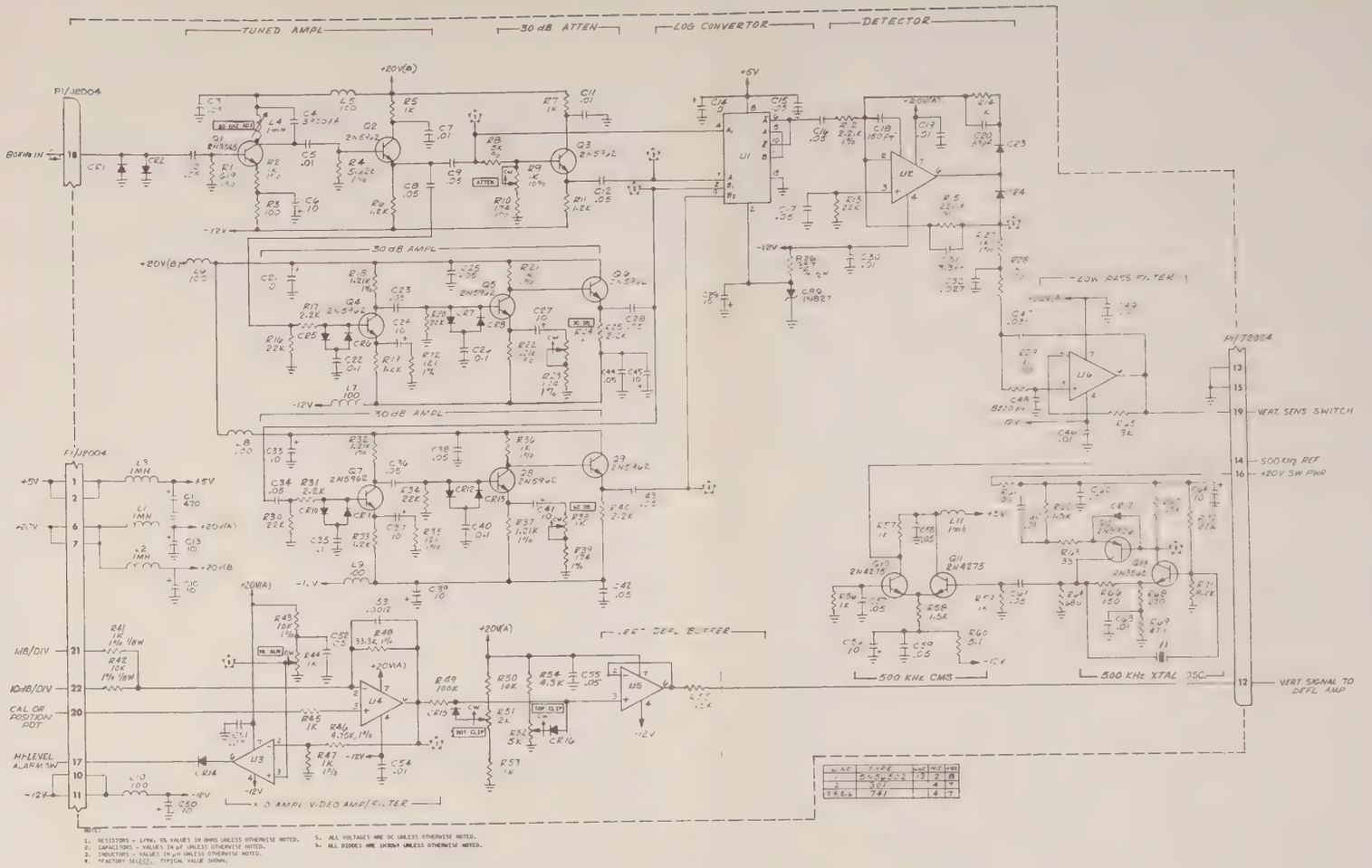


Figure 3-6. Logarithmic Amplifier, 2200

MASTER PHASE LOCK LOOP, 2300

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
2300	PCB Assy, Master PLL	7001-0418	Cushman	
	PC Board	1780-0570	Cushman	
	CAPACITORS			
C1	Cap, 100μF, 10%, 25V	1013-0003	Sprague	30D107G025DD5
C2	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C3	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C4	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C5	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C6	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C7	Cap, 100μF, 10%, 25V	1013-0003	Sprague	30D107G025DD5
C8	Not Used			
C9	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C10	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C11	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C12	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C13	Cap, 510PF, 5%, 500V Mica	1002-0036	Elmenco	DM15-F-511J
C14	Cap, 430PF, 5%, 500V Mica	1002-0034	Elmenco	DM15-F-431J
C15	Cap, 20PF, 5%, 500V Mica	1002-0060	Elmenco	DM15-E-200J
C16	Cap, 5PF, .5PF%, 500V Mica	1002-0028	Elmenco	DM15-C-050D
C17	Cap, .01μF, 20%, 100V Mini	1005-0100	Erie	8121-100-651-103M
C18	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C19	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C20	Cap, 5PF, .5PF%, 500V Mica	1002-0028	Elmenco	DM15-C-050C
C21	Cap, 5PF, .5PF%, 500V Mica	1002-0028	Elmenco	DM15-C-050C
C22	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C23	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C24	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C25	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C26	Cap, .01μF, 20%, 100V Mini	1005-0100	Erie	8121-100-651-103M
C27	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C28	Cap, 1000PF, 10%, 100V Min Cer	1005-0081	Erie	8121-100-W5R-102K
C29	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C30	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C31	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C32	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C33	Cap, 43PF, 5%, 500V Mica	1002-0046	Elmenco	DM15-E-430J
C34	Cap, 820PF, 5%, 300V Mica	1002-0039	Elmenco	DM15-F-821J
C35	Cap, 15PF, 5%, 500V Mica	1002-0001	Elmenco	DM15-C-150J
C36	Cap, 1100PF, 5%, 500V Mica	1002-0071	Elmenco	DM19-F-112J
C37	Cap, .1μF, 10%, 100V	1008-0031	Sprague	225P10491WA3
C38	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C39	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C40	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C41	Cap, 100μF, +75-10%, 12V	1013-0011	Sprague	30D107G012CC5
C42	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C43	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C44	Cap, 200PF, 5%, 500V Mica	1002-0042	Elmenco	DM15-F-201J
C45	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z

MASTER PHASE LOCK LOOP, 2300 (cont)

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
C46	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C47	Cap, .047μF, 10%, 100V	1008-0049	Sprague	225P47391WA3
C48	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C49	Cap, 470PF, 5%, 500V Mica	1002-0035	Elmenco	DM15-F-471J
C50	Cap, 100PF, 5%, 500V Mica	1002-0011	Elmenco	DM15-F-101J
C51	Cap, 560PF, 5%, 300V Mica	1002-0037	Elmenco	DM15-F-561J
C52	Cap, 560PF, 5%, 300V Mica	1002-0037	Elmenco	DM15-F-561J
C53	Cap, 430PF, 5%, 500V Mica	1002-0034	Elmenco	DM15-F-431J
C54	Cap, 390PF, 5%, 500V Mica	1002-0033	Elmenco	DM15-F-391J
C55	Cap, 270PF, 5%, 500V Mica	1002-0031	Elmenco	DM15-F-271J
C56	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C57	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C58	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C59	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C60	Cap, 470PF, 5%, 500V Mica	1002-0035	Elmenco	DM15-F-471J
C61	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C62	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C63	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C64	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C65	Cap, 1000PF, 10%, 100V Min Cer	1005-0081	Erie	8121-100-W5R-102K
C66	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C67	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C68	Cap, 1000PF, 10%, 100V Min Cer	1005-0081	Erie	8121-100-W5R-102K
C69	Cap, 18PF, 5%, 500V Mica	1002-0014	Elmenco	DM15-C-180J
C70	Cap, 220PF, 10%, 100V Mini	1005-0075	Erie	8101-A100-W5R0-221K
C71	Cap, 1000PF, 10%, 100V Min Cer	1005-0081	Erie	8121-100-W5R-102K
C72	Cap, 820PF, 5%, 300V Mica	1002-0039	Elmenco	DM15-F-821J
C73	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
	DIODES			
CR1	Diode, HPA2800	1283-0001	HPA	5082-2800
CR2	Diode, HPA2800	1283-0001	HPA	5082-2800
CR3	Diode, HPA2800	1283-0001	HPA	5082-2800
CR4	Diode, HPA2800	1283-0001	HPA	5082-2800
CR5	Diode, 1N4733A	1281-0031	Motorola	1N4733A
CR6	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR7	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR8	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR9	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR10	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR11	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR12	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR13	Diode, MV109 Varicap 29PF 30V.4W	1281-0064	Motorola	MV109
CR14	Diode, MV109 Varicap 29PF 30V.4W	1281-0064	Motorola	MV109
CR15	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR16	Diode, 1N3064	1281-0013	Teledyne	1N3064
	CONNECTORS			
J1	Conn, SMB 50Ohm Rtang Jk PC Mt Snap-on	2536-0060	Cablewave	700214NP
J2	Conn, SMB 50 Ohm Rtang Jk PC Mt Snap-on	2536-0060	Cablewave	700214NP

MASTER PHASE LOCK LOOP, 2300 (cont)

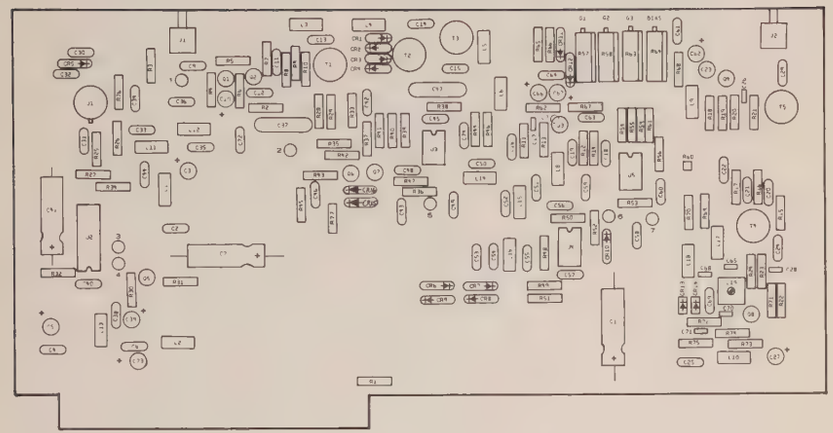
CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
	INDUCTORS			
L1	Choke, 1000μH, 5%	1585-0020	Delevan	2500-28
L2	Choke, 1000μH, 5%	1585-0020	Delevan	2500-28
L3	Choke, 1.5μH, 10%	1585-0038	Delevan	1537-16
L4	Choke, 1μH, 10%	1585-0027	Delevan	1537-12
L5	Choke, .22μH, 20%	1585-0039	Delevan	1537-02
L6	Choke, 1μH, 10%	1585-0027	Delevan	1537-12
L7	Choke, U-250 Ferrite Bead	1586-0004	Ferroxcube	56-590-65/4B
L8	Choke, 56μH, 5%, RF	1585-0042	Delevan	1537-64
L9	Choke, 56μH, 5%, RF	1585-0042	Delevan	1537-64
L10	Choke, 4.7μH, 10%	1585-0021	Delevan	1537-28
L11	Choke, 1μH, 10%	1585-0027	Delevan	1537-12
L12	Choke, 1μH, 10%	1585-0027	Delevan	1537-12
L13	Choke, 1000μH, 5%	1585-0020	Delevan	2500-28
L14	Choke, 470μH, 5%	1585-0019	Delevan	2500-12
L15	Choke, 220μH, 5%	1585-0018	Delevan	1537-92
L16	CH-270μH, 5% RF Molded	1585-0081	Delevan	2500-00
L17	Choke, 1.5μH, 10%	1585-0038	Delevan	1537-16
L18	Choke, 1.5μH, 10%	1585-0038	Delevan	1537-16
L19	Coil, Variable IF (10 turn)	1596-8105	Cushman	
	TRANSISTORS			
Q1	Trans, 2N3906	1272-0037	Motorola	2N3906
Q2	Trans, 2N3563	1272-0022	Fairchild	2N3563
Q3	Trans, 2N5179 (RCA)	1272-0067	RCA	2N5179
Q4	Trans, 2N3563	1272-0022	Fairchild	2N3563
Q5	Trans, 2N4275	1272-0016	Fairchild	2N4275
Q6	Trans, 2N3565	1272-0017	Fairchild	2N3565
Q7	Trans, 2N3565	1272-0017	Fairchild	2N3565
Q8	Trans, 2N5179 (RCA)	1272-0067	RCA	2N5179
	RESISTORS			
R1	Res, 5.1 Ohm, 5%, 1/4W Comp	1066-0002	Allen-Bradley	CB0002
R2	Res, 5.1 Ohm, 5%, 1/4W Comp	1066-0002	Allen-Bradley	CB0002
R3	Res, 51 Ohm, 5%, 1/4W Comp	1066-5105	Allen-Bradley	CB5105
R4	Res, 3.9K, 5%, 1/4W Comp	1066-3925	Allen-Bradley	CB3925
R5	Res, 8.2K, 5%, 1/4W Comp	1066-8225	Allen-Bradley	CB8225
R6	Res, 4.7K, 5%, 1/4W Comp	1066-4725	Allen-Bradley	CB4725
R7	Res, 1.5K, 5%, 1/4W Comp	1066-1525	Allen-Bradley	CB1525
R8	Res, 10 Ohm, 5%, 1/4W Comp	1066-1005	Allen-Bradley	CB1005
R9	Res, 10 Ohm, 5%, 1/4W Comp	1066-1005	Allen-Bradley	CB1005
R10	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R11	Res, 3.3K, 5%, 1/4W Comp	1066-3325	Allen-Bradley	CB3325
R12	Res, 47 Ohm, 5%, 1/4W Comp	1066-4705	Allen-Bradley	CB4705
R13	Res, 3.9K, 5%, 1/4W Comp	1066-3925	Allen-Bradley	CB3925
R14	Res, 510 Ohm, 5%, 1/4W Comp	1066-5115	Allen-Bradley	CB5115
R15	Res, 51 Ohm, 5%, 1/4W Comp	1066-5105	Allen-Bradley	CB5105

MASTER PHASE LOCK LOOP, 2300 (cont)

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R16	Res, 51 Ohm, 5%, 1/4W Comp	1066-5105	Allen-Bradley	CB5105
R17	Res, 51 Ohm, 5%, 1/4W Comp	1066-5105	Allen-Bradley	CB5105
R18	Res, 47 Ohm, 5%, 1/4W Comp	1066-4705	Allen-Bradley	CB4705
R19	Res, 2K, 5%, 1/4W Comp	1066-2025	Allen-Bradley	CB2025
R20	Res, 3.9K, 5%, 1/4W Comp	1066-3925	Allen-Bradley	CB3925
R21	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R22	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R23	Res, 68 Ohm, 5%, 1/4W Comp	1066-6805	Allen-Bradley	CB6805
R24	Res, 390 Ohm, 5%, 1/4W Comp	1066-3915	Allen-Bradley	CB3915
R25	Res, 3.3 Ohm, 5%, 1/4W Comp	1066-0006	Allen-Bradley	CB0006
R26	Res, 100K, 5%, 1/4W Carbon Comp	1066-1045	Allen-Bradley	CB1045
R27	Res, 5.1 Ohm, 5%, 1/4W Comp	1066-0002	Allen-Bradley	CB0002
R28	Res, 24 Ohm, 5%, 1/4W Comp	1066-2405	Allen-Bradley	CB2405
R29	Res, 120 Ohm, 5%, 1/4W Comp	1066-1215	Allen-Bradley	CB1215
R30	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025
R31	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025
R32	Res, 5.1 Ohm, 5%, 1/4W Comp	1066-0002	Allen-Bradley	CB0002
R33	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R34	Res, 1.62K, 1%, 1/8W MF	1075-0070	Dale	MF 1/8
R35	Res, 1.62K, 1%, 1/8W MF	1075-0070	Dale	MF 1/8
R36	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R37	Res, 12K, 5%, 1/4W Comp	1066-1235	Allen-Bradley	CB1235
R38	Res, 383K, 1%, 1/8W MF	1075-0115	Dale	MF 1/8
R39	Res, 51.1K, 1%, 1/8W MF	1075-0099	Dale	MF 1/8
R40	Res, 432 Ohm 1% 1/10WMF 100 PPM	1075-0142	Dale	MF 1/8
R41	Res, 1.62K, 1%, 1/8W MF	1075-0070	Dale	MF 1/8
R42	Res, 15K, 5%, 1/4W Comp	1066-1535	Allen-Bradley	CB1535
R43	Res, 6.2K, 5%, 1/4W Comp	1066-6225	Allen-Bradley	CB6225
R44	Res, 470 Ohm, 5%, 1/4W Comp	1066-4715	Allen-Bradley	CB4715
R45	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R46	Res, 1K, 1%, 1/8W MF	1075-0037	Dale	MF 1/8
R47	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025
R48	Res, 17.8K, 1%, 1/10W MF	1074-1021	Dale	MF 1/10
R49	Res, 36.5K, 1%, 1/8W MF	1075-0113	Dale	MF 1/8
R50	Res, 4.75K, 1%, 1/8W MF	1075-0038	Dale	MF 1/8
R51	Res, 10K, 1%, 1/8W MF	1075-0009	Dale	MF 1/8
R52	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R53	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R54	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R55	Res, 22K, 5%, 1/4W Comp	1066-2235	Allen-Bradley	CB2235
R56	Res, 560 Ohm, 5%, 1/4W Comp	1066-5615	Allen-Bradley	CB5615
R57	Pot, 20K, 10%, 3/4W	1215-0021	Beckman	89WR
R58	Pot, 20K, 10%, 3/4W	1215-0021	Beckman	89WR
R59	Res, 5.1K, 5%, 1/4W Comp	1066-5125	Allen-Bradley	CB5125
R60	Thrmis, 1K	1253-0002	Veco	31E2
R61	Res, 27K, 5%, 1/4W Comp	1066-2735	Allen-Bradley	CB2735
R62	Res, 1.2K, 5%, 1/4W Comp	1066-1225	Allen-Bradley	CB1225
R63	Pot, 20K, 10%, 3/4W	1215-0021	Beckman	89WR
R64	Pot, 20K, 10%, 3/4W	1215-0021	Beckman	89WR
R65	Res, 3.3K, 5%, 1/4W Comp	1066-3325	Allen-Bradley	CB3325

MASTER PHASE LOCK LOOP, 2300 (cont)

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R66	Res, 750 Ohm, 5%, 1/4W Comp	1066-7515	Allen-Bradley	CB7515
R67	Res, 510 Ohm, 5%, 1/4W Comp	1066-5115	Allen-Bradley	CB5115
R68	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R69	Res, 220 Ohm, 5%, 1/4W Comp	1066-2215	Allen-Bradley	CB2215
R70	Res, 220 Ohm, 5%, 1/4W Comp	1066-2215	Allen-Bradley	CB2215
R71	Res, 15K, 5%, 1/4W Comp	1066-1535	Allen-Bradley	CB1535
R72	Res, 100K, 5%, 1/4W Carbon Comp	1066-1045	Allen-Bradley	CB1045
R73	Res, 4.7K, 5%, 1/4W Comp	1066-4725	Allen-Bradley	CB4725
R74	Res, 2.7 Ohm, 5%, 1/4W Comp	1066-0007	Allen-Bradley	CB0007
R75	Res, 220 Ohm, 5%, 1/4W Comp	1066-2215	Allen-Bradley	CB2215
R76	Res, 51 Ohm, 5%, 1/4W Comp	1066-5105	Allen-Bradley	CB5105
R77	Res, 6.8k, 5%, 1/4W Comp	1066-6825	Allen-Bradley	CB6825
	TRANSFORMERS			
T1	Assy, Trifilar Coil	1579-0017	Cushman	
T2	Assy, Trifilar Coil	1579-0017	Cushman	
T3	Assy, Trifilar Coil	1579-0017	Cushman	
T4	Assy, Trifilar Coil	1579-0017	Cushman	
T5	Assy, Trifilar Coil	1579-0017	Cushman	
	INTEGRATED CIRCUITS			
U1	IC, UA710C Hi Spd Diff. Comparator	2025-0028	Fairchild	UA710C
U2	IC, MC4044P Phase Detector	2025-0066	Motorola	MC4044P
U3	IC, SN72741P	2025-0067	T.I.	SN72741P
U4	IC, SN72741P	2025-0067	T.I.	SN72741P
U5	IC, SN72741P	2025-0067	T.I.	SN72741P



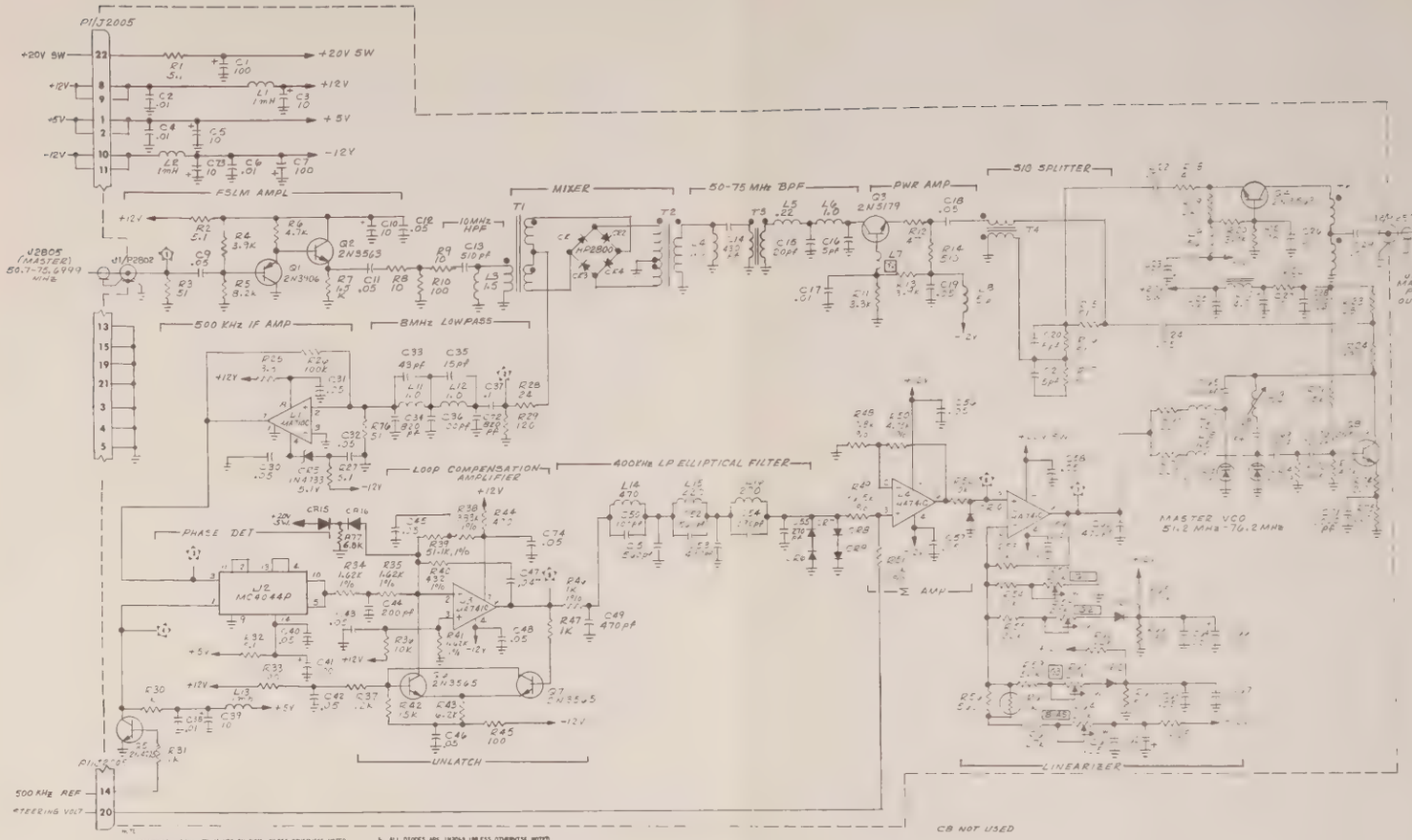


Figure 3-7. Master Phase Lock Loop, 2300

MARKER/VARIABLE OSCILLATOR, 2400

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
2400	PCB Assy, Marker/Variable Osc	7001-0419	Cushman	
	PC Board	1780-0572	Cushman	
	CAPACITORS			
C1	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C2	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C3	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C4	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C5	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C6	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C7	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C8	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C9	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C10	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C11	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C12	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C13	Cap, .002μF, 20%, 500V Disc	1005-0003	Erie	831-596-Z5U-202M
C14	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C15	Cap, .002μF, 20%, 500V Disc	1005-0003	Erie	831-596-Z5U-202M
C16	Cap, 1100PF, 5%, 500V Mica	1002-0071	Elmenco	DM19-F-112J
C17	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C18	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C19	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C20	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C21	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C22	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C23	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C24	Cap, 1.5μF, 10%, 35V	1013-0001	Sprague	150D155X9035B2
C25	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C26	Cap, .002μF, 20%, 500V Disc	1005-0003	Erie	831-596-Z5U-202M
C27	Cap, .002μF, 20%, 500V Disc	1005-0003	Erie	831-596-Z5U-202M
C28	Cap, 1100PF, 5%, 500V Mica	1002-0071	Elmenco	DM19-F-112J
C29	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C30	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C31	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C32	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C33	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C34	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C35	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C36	Cap, .027μF, 1%, 50V	1008-0064	Elpac	PDA
C37	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C38	Cap, 100μF, 20%, 20V	1011-0010	Kemet	T362D107M020AS
C39	Cap, 100PF, 5%, 500V Mica	1002-0011	Elmenco	DM15-F-101J
C40	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C41	Cap, 4700PF, 5%, 500V Mica	1002-0070	Elmenco	DM19-F-472J
C42	Cap, 4700PF, 5%, 500V Mica	1002-0070	Elmenco	DM19-F-472J
C43	Cap, 4700PF, 5%, 500V Mica	1002-0070	Elmenco	DM19-F-472J
C44	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C45	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z

MARKER/VARIABLE OSCILLATOR, 2400 (cont)

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
C46	Cap, .22μF, 10%, 100V Mylar	1008-0091	Electrocube	232A1B224K
C47	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C48	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C49	Cap, .47μF, 100V 10% Met Mylar	1008-0038	Electrocube	210B1A474K
C50	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C51	Cap, 10μF, +100-10%, 25V Elctlt Rdl	1013-0035	Sprague	503D106G025AS
C52	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C53	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C54	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C55	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C56	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C57	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C58	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C59	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C60	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C61	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C62	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C63	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C64	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C65	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C66	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C67	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C68	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C69	Cap, 180PF, 5%, 500V Mica	1002-0005	Elmenco	DM15-F-181J
C70	Cap, 180PF, 5%, 500V Mica	1002-0005	Elmenco	DM15-F-181J
C71	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C72	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C73	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C74	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C75	Cap, 160PF, 5%, 50V	1005-0088	Stettner-Trush	EDPU-10X10
C76	Cap, 160PF, 5%, 50V	1005-0088	Stettner-Trush	EDPU-10X10
C77	Cap, 160PF, 5%, 50V	1005-0088	Stettner-Trush	EDPU-10X10
C78	Cap, 1000PF, 5%, 100V Mica	1002-0015	Elmenco	DM15-F102J
C79	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C80	Cap, 3900PF, 5%, 500V Mica	1002-0079	Elmenco	DM19-F-392J
C81	Cap, 100PF, 5%, 500V Mica	1002-0011	Elmenco	DM15-F-101J
C82	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C83	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C84	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C85	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C86	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C87	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C88	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C89	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
	DIODES			
CR1	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR2	Diode, 1N4737	1281-0026	I. R.	1N4737A
CR3	Diode, MV1404	1281-0062	Motorola	MV1404
CR4	Diode, MV1404	1281-0062	Motorola	MV1404
CR5	Diode, 1N3064	1281-0013	Teledyne	1N3064

MARKER/VARIABLE OSCILLATOR, 2400 (cont)

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
	INDUCTORS			
L1	Choke, 2 1/2 Turns Wide Band	1586-0003	VK	20020/4B
L2	Choke, 2 1/2 Turns Wide Band	1586-0003	VK	20020/4B
L3	Choke, 2 1/2 Turns Wide Band	1586-0003	VK	20020/4B
L4	Choke, 2 1/2 Turns Wide Band	1586-0003	VK	20020/4B
L5	Choke, 4.7μH, 10%	1585-0021	Delevan	1537-28
L6	Choke, .56μH, 10%	1585-0036	Delevan	1840-07
L7	Choke, .56μH, 10%	1585-0036	Delevan	1840-07
L8	Choke, 22MH, 15%	1585-0029	Delevan	2534-56
L9	Choke, .68μH, 10%	1585-0024	Delevan	1537-08
L10	Choke, .68μH, 10%	1585-0024	Delevan	1537-08
L11	Assy, Coil Variable	1596-0066	Cushman	
L12	Choke, 2 1/2 Turns Wide Band	1586-0003	VK	20020/4B
L13	Choke, 1000μH, 5%	1585-0020	Delevan	2500-28
	TRANSISTORS			
Q1	Trans, 2N5179 (Motorola)	1272-0060	Motorola	2N5179
Q2	Trans, 2N5179 (Motorola)	1272-0060	Motorola	2N5179
Q3	Trans, 2N5179 (Motorola)	1272-0060	Motorola	2N5179
Q4	Trans, 2N5179 (Motorola)	1272-0060	Motorola	2N5179
Q5	Trans, 2N4275	1272-0016	Fairchild	2N4275
Q6	Trans, 2N5179 (Motorola)	1272-0060	Motorola	2N5179
Q7	Trans, 2N5179 (Motorola)	1272-0060	Motorola	2N5179
Q8	Trans, 2N5179 (Motorola)	1272-0060	Motorola	2N5179
Q9	Trans, 2N5179 (Motorola)	1272-0060	Motorola	2N5179
Q10	Trans, 2N4275	1272-0016	Fairchild	2N4275
Q11	Trans, 2N4275	1272-0016	Fairchild	2N4275
Q12	Trans, 2N4275	1272-0016	Fairchild	2N4275
Q13	Trans, 2N4249	1272-0024	Fairchild	2N4249
Q14	Trans, 2N3642	1272-0018	Fairchild	2N3642
Q15	Trans, 2N4249	1272-0024	Fairchild	2N4249
Q16	Trans, 2N3642	1272-0018	Fairchild	2N3642
Q17	Trans, 2N4275	1272-0016	Fairchild	2N4275
Q18	Trans, 2N4275	1272-0016	Fairchild	2N4275
Q19	Trans, 2N4275	1272-0016	Fairchild	2N4275
Q20	Trans, 2N3642	1272-0018	Fairchild	2N3642
Q21	Trans, 2N5962	1272-0059	Fairchild	2N5962
Q22	Trans, 2N5962	1272-0059	Fairchild	2N5962
Q23	Trans, 2N4416	1272-0048	Teledyne	2N4416
Q24	Trans, 2N5087	1272-0038	Motorola	2N5087
Q25	Trans, 2N4275	1272-0016	Fairchild	2N4275
Q26	Trans, 2N4275	1272-0016	Fairchild	2N4275
Q27	Trans, 2N4249	1272-0024	Fairchild	2N4249
	RESISTORS			
R1	Res, 51 Ohm, 5%, 1/4W Comp	1066-5105	Allen-Bradley	CB5105
R2	Res, 220 Ohm, 5%, 1/4W Comp	1066-2215	Allen-Bradley	CB2215
R3	Res, 2.7 Ohm, 5%, 1/4W Comp	1066-0007	Allen-Bradley	CB0007
R4	Res, 1.2K, 5%, 1/4W Comp	1066-1225	Allen-Bradley	CB1225
R5	Res, 820 Ohm, 5%, 1/4W Comp	1066-8215	Allen-Bradley	CB8215

MARKER/VARIABLE OSCILLATOR, 2400 (cont)

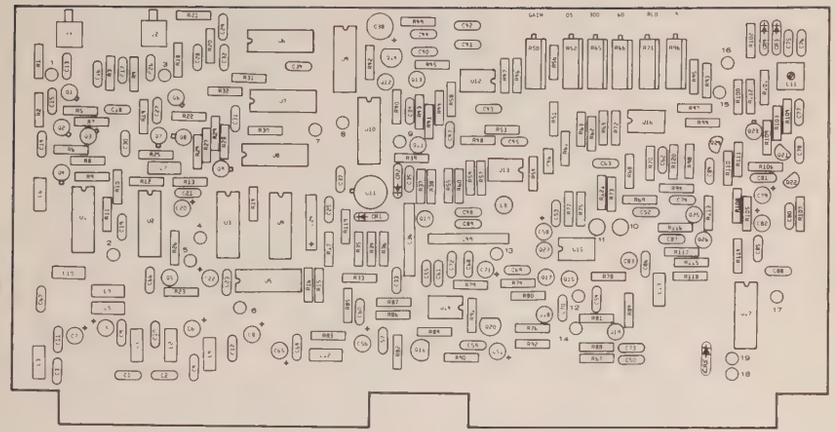
CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R6	Res, 330 Ohm, 5%, 1/4W Comp	1066-3315	Allen-Bradley	CB3315
R7	Res, 680 Ohm, 5%, 1/4W Comp	1066-6815	Allen-Bradley	CB6815
R8	Res, 51 Ohm, 5%, 1/4W Comp	1066-5105	Allen-Bradley	CB5105
R9	Res, 1.8K, 5%, 1/4W Comp	1066-1825	Allen-Bradley	CB1825
R10	Res, 2.7 Ohm, 5%, 1/4W Comp	1066-0007	Allen-Bradley	CB0007
R11	Res, 1.8K, 5%, 1/4W Comp	1066-1825	Allen-Bradley	CB1825
R12	Res, 1.8K, 5%, 1/4W Comp	1066-1825	Allen-Bradley	CB1825
R13	Res, 2.7 Ohm, 5%, 1/4W Comp	1066-0007	Allen-Bradley	CB0007
R14	Res, 5.1 Ohm, 5%, 1/4W Comp	1066-0002	Allen-Bradley	CB0002
R15	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R16	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R17	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025
R18	Res, 51 Ohm, 5%, 1/4W Comp	1066-5105	Allen-Bradley	CB5105
R19	Res, 220 Ohm, 5%, 1/4W Comp	1066-2215	Allen-Bradley	CB2215
R20	Res, 2.7 Ohm, 5%, 1/4W Comp	1066-0007	Allen-Bradley	CB0007
R21	Res, 1.2K, 5%, 1/4W Comp	1066-1225	Allen-Bradley	CB1225
R22	Res, 820 Ohm, 5%, 1/4W Comp	1066-8215	Allen-Bradley	CB8215
R23	Res, 5.1K, 5%, 1/4W Comp	1066-5125	Allen-Bradley	CB5125
R24	Res, 330 Ohm, 5%, 1/4W Comp	1066-3315	Allen-Bradley	CB3315
R25	Res, 680 Ohm, 5%, 1/4W Comp	1066-6815	Allen-Bradley	CB6815
R26	Res, 2.7K, 5%, 1/4W Comp	1066-2725	Allen-Bradley	CB2725
R27	Res, 51 Ohm, 5%, 1/4W Comp	1066-5105	Allen-Bradley	CB5105
R28	Res, 1.8K, 5%, 1/4W Comp	1066-1825	Allen-Bradley	CB1825
R29	Res, 2.7 Ohm, 5%, 1/4W Comp	1066-0007	Allen-Bradley	CB0007
R30	Res, 1.8K, 5%, 1/4W Comp	1066-1825	Allen-Bradley	CB1825
R31	Res, 1.8K, 5%, 1/4W Comp	1066-1825	Allen-Bradley	CB1825
R32	Res, 2.7 Ohm, 5%, 1/4W Comp	1066-0007	Allen-Bradley	CB0007
R33	Res, 10 Ohm, 5%, 1/4W Comp	1066-1005	Allen-Bradley	CB1005
R34	Res, 10K, 1%, 1/8W MF	1075-0009	Dale	MF 1/8
R35	Res, 1.43K, 1%, 1/8W MF	1075-0021	Dale	MF 1/8
R36	Res, 11.4K, .5%, .15W WW	1177-0003	Jordon	J110
R37	Res, 5.1 Ohm, 5%, 1/4W Comp	1066-0002	Allen-Bradley	CB0002
R38	Res, 2.2K, 5%, 1/4W Comp	1066-2225	Allen-Bradley	CB2225
R39	Res, 4.7K, 5%, 1/4W Comp	1066-4725	Allen-Bradley	CB4725
R40	Res, 4.7K, 5%, 1/4W Comp	1066-4725	Allen-Bradley	CB4725
R41	Res, 2.2K, 5%, 1/4W Comp	1066-2225	Allen-Bradley	CB2225
R42	Res, 2.2K, 5%, 1/4W Comp	1066-2225	Allen-Bradley	CB2225
R43	Res, 4.7K, 5%, 1/4W Comp	1066-4725	Allen-Bradley	CB4725
R44	Res, 51 Ohm, 5%, 1/4W Comp	1066-5105	Allen-Bradley	CB5105
R45	Res, 69.8K, 1%, 1/8W MF	1075-0100	Dale	MF 1/8
R46	Res, 33.2K, 1%, 1/8W MF	1075-0098	Dale	MF 1/8
R47	Res, 78.7K, 1%, 1/8W MF	1075-0060	Dale	MF 1/8
R48	Res, 10 Ohm, 5%, 1/4W Comp	1066-1005	Allen-Bradley	CB1005
R49	Res, 10 Ohm, 5%, 1/4W Comp	1066-1005	Allen-Bradley	CB1005
R50	Pot, 1K, 10%, 3/4W	1215-0013	Helitrim	89WR
R51	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025
R52	Pot, 10K, 10%, 3/4W	1215-0014	Helitrim	89WR
R53	Res, 1.82K, 1%, 1/8W MF	1075-0065	Dale	MF 1/8
R54	Res, 10K, 1%, 1/8W MF	1075-0009	Dale	MF 1/8
R55	Res, 10 Ohm, 5%, 1/4W Comp	1066-1005	Allen-Bradley	CB1005

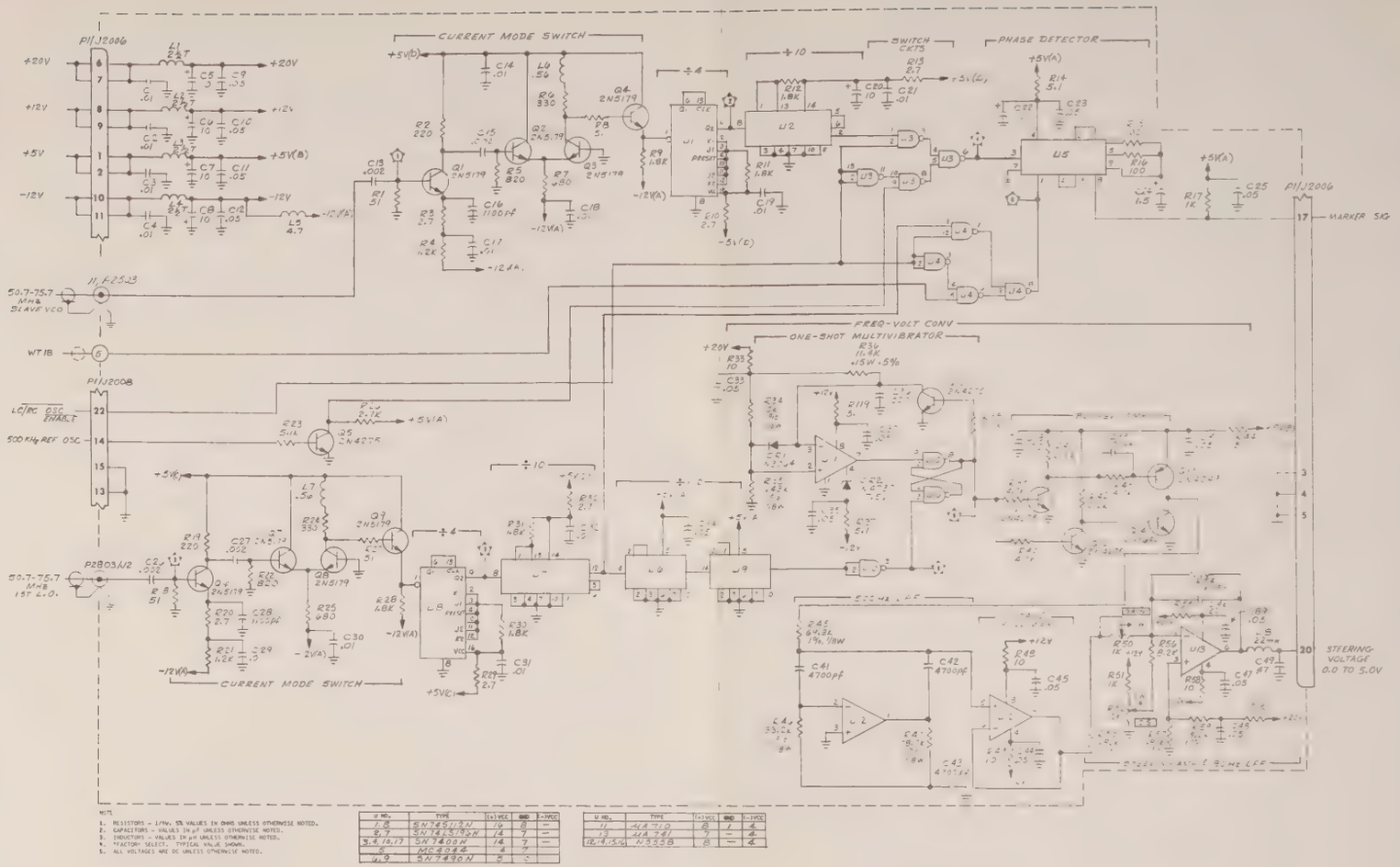
MARKER/VARIABLE OSCILLATOR, 2400 (cont)

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R56	Res, 8.2K, 5%, 1/4W Comp	1066-8225	Allen-Bradley	CB8225
R57	Res, 1.82K, 1%, 1/8W MF	1075-0065	Dale	MF 1/8
R58	Res, 10 Ohm, 5%, 1/4W Comp	1066-1005	Allen-Bradley	CB1005
R59	Res, 18.2K, 1%, 1/8W MF	1075-0075	Dale	MF 1/8
R60	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R61	Res, 5.1K, 5%, 1/4W Comp	1066-5125	Allen-Bradley	CB5125
R62	Res, 5.1K, 5%, 1/4W Comp	1066-5125	Allen-Bradley	CB5125
R63	Res, 10K, 1%, 1/8W MF	1075-0009	Dale	MF 1/8
R64	Res, 61.9K, 1%, 1/8W MF	1075-0018	Dale	MF 1/8
R65	Pot, 20K, 10%, 3/4W	1215-0021	Beckman	89WR
R66	Pot, 50K, 10%, 3/4W	1215-0023	Beckman	89WR
R67	Res, 10 Ohm, 5%, 1/4W Comp	1066-1005	Allen-Bradley	CB1005
R68	Res, 10K, 1%, 1/8W MF	1075-0009	Dale	MF 1/8
R69	Res, 10 Ohm, 5%, 1/4W Comp	1066-1005	Allen-Bradley	CB1005
R70	Res, 5.1K, 5%, 1/4W Comp	1066-5125	Allen-Bradley	CB5125
R71	Pot, 5K, 10%, 3/4W	1215-0012	Helitrim	89WR
R72	Res, 15K, 1%, 1/8W MF	1075-0081	Dale	MF 1/8
R73	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R74	Res, 680 Ohm, 5%, 1/4W Comp	1066-6815	Allen-Bradley	CB6815
R75	Res, 10K, 1%, 1/8W MF	1075-0009	Dale	MF 1/8
R76	Res, 680 Ohm, 5%, 1/4W Comp	1066-6815	Allen-Bradley	CB6815
R77	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R78	Res, 10 Ohm, 5%, 1/4W Comp	1066-1005	Allen-Bradley	CB1005
R79	Res, 10 Ohm, 5%, 1/4W Comp	1066-1005	Allen-Bradley	CB1005
R80	Res, 10K, 1%, 1/8W MF	1075-0009	Dale	MF 1/8
R81	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R82	Res, 4.99K, 1%, 1/8W MF	1075-0095	Dale	MF 1/8
R83	Res, 15K, 1%, 1/8W MF	1075-0081	Dale	MF 1/8
R84	Res, 5.6K, 5%, 1/4W Comp	1066-5625	Allen-Bradley	CB5625
R85	Res, 10 Ohm, 5%, 1/4W Comp	1066-1005	Allen-Bradley	CB1005
R86	Res, 15K, 1%, 1/8W MF	1075-0081	Dale	MF 1/8
R87	Res, 4.99K, 1%, 1/8W MF	1075-0095	Dale	MF 1/8
R88	Res, 10 Ohm, 5%, 1/4W Comp	1066-1005	Allen-Bradley	CB1005
R89	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025
R90	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R91	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025
R92	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R93	Res, 5.1K, 5%, 1/4W Comp	1066-5125	Allen-Bradley	CB5125
R94	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R95	Res, 4.99K, 1%, 1/8W MF	1075-0095	Dale	MF 1/8
R96	Pot, 20K, 10%, 3/4W	1215-0021	Beckman	89WR
R97	Res, 1.24K, 1%, 1/8W MF	1074-0087	Dale	MF 1/8
R98	Res, 20K, 1%, 1/8W MF	1075-0096	Dale	MF 1/8
R99	Res, 10K, 1%, 1/8W MF	1075-0009	Dale	MF 1/8
R100	Res, 24.3K, 1%, 1/8W MF	1075-0097	Dale	MF 1/8
R101	Res, 10K, 1%, 1/8W MF	1075-0009	Dale	MF 1/8
R102	Res, 39.2K, 1%, 1/10W MF	1074-1032	Dale	MF 1/10
R103	Res, 680K, 5%, 1/4W Comp	1066-6845	Allen-Bradley	CB6845
R104	Res, 680K, 5%, 1/4W Comp	1066-6845	Allen-Bradley	CB6845
R105	Res, 3.9K, 5%, 1/4W Comp	1066-3925	Allen-Bradley	CB3925

MARKER/VARIABLE OSCILLATOR, 2400 (cont)

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R106	Res, 68K, 5%, 1/4W Comp	1066-6835	Allen-Bradley	CB6835
R107	Res, 6.8K, 5%, 1/4W Comp	1066-6825	Allen-Bradley	CB6825
R108	Res, 120K, 5%, 1/4W Comp	1066-1245	Allen-Bradley	CB1245
R109	Res, 2 Meg, 5%, 1/4W Comp	1066-2055	Allen-Bradley	CB2055
R110	Res, 470 Ohm, 5%, 1/4W Comp	1066-4715	Allen-Bradley	CB4715
R111	Res, 120K, 5%, 1/4W Comp	1066-1245	Allen-Bradley	CB1245
R112	Res, 820 Ohm, 5%, 1/4W Comp	1066-8215	Allen-Bradley	CB8215
R113	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025
R114	Res, 10 Ohm, 5%, 1/4W Comp	1066-1005	Allen-Bradley	CB1005
R115	Res, 2K, 5%, 1/4W Comp	1066-2025	Allen-Bradley	CB2025
R116	Res, 2.7K, 5%, 1/4W Comp	1066-2725	Allen-Bradley	CB2725
R117	Res, 51K, 5%, 1/4W Comp	1066-5135	Allen-Bradley	CB5135
R118	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025
R119	Res, 5.1 Ohm, 5%, 1/4W Comp	1066-0002	Allen-Bradley	CB0002
R120	Res, 10 Ohm, 5%, 1/4W Comp	1066-1005	Allen-Bradley	CB1005
R121	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
	INTEGRATED CIRCUITS			
U1	IC, SN74S112N, Dual J-K Flip Flop	2025-0086	T.I.	SN74S112N
U2	IC, SN74LS196N, Decade Counter	2025-0111	T.I.	SN74LS196N
U3	IC, SN7400N, TTL Nand Gate	2025-0003	T.I.	SN7400N
U4	IC, SN7400N, TTL Nand Gate	2025-0003	T.I.	SN7400N
U5	IC, MC4044P, Phase Detector	2025-0066	Motorola	MC4044P
U6	IC, SN7490N	2025-0002	T.I.	SN7490N
U7	IC, SN74LS196N, Decade Counter	2025-0111	T.I.	SN74LS196N
U8	IC, SN74S112N, Dual J-K Flip Flop	2025-0086	T.I.	SN74S112N
U9	IC, SN7490N	2025-0002	T.I.	SN7490N
U10	IC, SN7400N TTL Nand Gate	2025-0003	T.I.	SN7400N
U11	IC, UA710C Hi Spd Diff. Comparator	2025-0028	Fairchild	U5B771039X
U12	IC, N5558V, Dual Op Amp	2025-0058	Signetics	N5558V
U13	IC, SN72741P	2025-0067	T.I.	SN72741P
U14	IC, N5558V, Dual Op Amp	2025-0058	Signetics	N5558V
U15	IC, N5558V, Dual Op Amp	2025-0058	Signetics	N5558V
U16	IC, N5558V, Dual Op Amp	2025-0058	Signetics	N5558V
U17	IC, SN7400N, TTL Nand Gate	2025-0003	T.I.	SN7400N





NOTE
1. RESISTORS - 1/4W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.
2. CAPACITORS - VALUES IN μF UNLESS OTHERWISE NOTED.
3. INDUCTORS - VALUES IN μH UNLESS OTHERWISE NOTED.
4. *FACTORY SELECT. TYPICAL VALUE SHOWN.
5. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.

U NO.	TYPE	(+)VCC	GND	(-)VCC
1,8	SN74S12N	16	8	—
2,7	SN74LS192N	14	7	—
3,4,16,17	SN7400N	14	7	—
5	MC4044	4	7	
6,9	SN7490N	5	0	

U NO.	TYPE	(+)VCC	GND	(-)VCC
11	4LA710	8	1	4
13	4LA741	7	—	4
12,14,15,16	N5558	8	—	4

Figure 3-8. Marker and Variable Oscillator, 2400, sheet 1

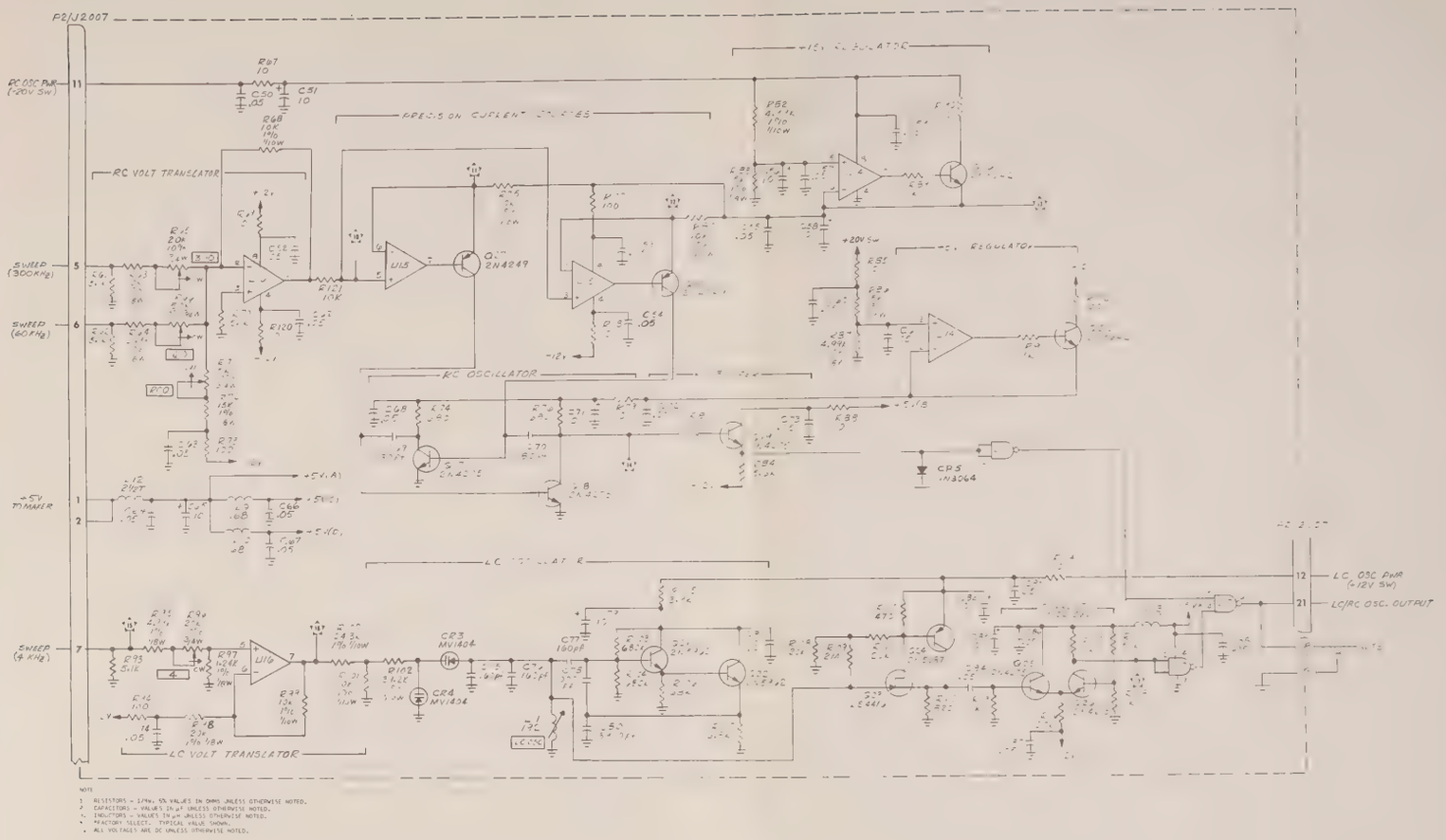


Figure 3-9. Marker and Variable Oscillator, 2400, sheet 2

5601**0069**1

SLAVE PHASE LOCK LOOP, 2500

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
2500	PCB Assy, Slave PLL	7001-0420	Cushman	
	PC Board	1780-0569	Cushman	
	CAPACITORS			
C1	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C2	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C3	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C4	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C5	Cap, 510PF, 5%, 500V Mica	1002-0036	Elmenco	DM15-F-511J
C6	Cap, 20PF, 5%, 500V Mica	1002-0060	Elmenco	DM15-E-200J
C7	Cap, 5PF, .5PF%, 500V Mica	1002-0028	Elmenco	DM15-C-050D
C8	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C9	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C10	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C11	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C12	Cap, 5PF, .5PF%, 500V Mica	1002-0028	Elmenco	DM15-C-050D
C13	Cap, 5PF, .5PF%, 500V Mica	1002-0028	Elmenco	DM15-C-050D
C14	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C15	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C16	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C17	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C18	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C19	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C20	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C21	Cap, 43PF, 5%, 500V Mica	1002-0046	Elmenco	DM15-E-430J
C22	Cap, 820PF, 5%, 300V Mica	1002-0039	Elmenco	DM15-F-821J
C23	Cap, 15PF, 5%, 500V Mica	1002-0001	Elmenco	DM15-C-150J
C24	Cap, 1100PF, 5%, 500V Mica	1002-0071	Elmenco	DM19-F-112J
C25	Cap, .1μF, 10%, 100V	1008-0031	Sprague	225P10491WA3
C26	Cap, 820PF, 5%, 300V Mica	1002-0039	Elmenco	DM15-F-821J
C27	Cap, 100μF, 20%, 20V	1011-0010	Kemet	T362D107M020AS
C28	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C29	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C30	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C31	Cap, 470PF, 5%, 500V Mica	1002-0035	Elmenco	DM15-F-471J
C32	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C33	Cap, 1000PF, 10%, 100V Min Cer	1005-0081	Erie	8121-100-W5R-102K
C34	Cap, 1000PF, 10%, 100V Min Cer	1005-0081	Erie	8121-100-W5R-102K
C35	Cap, 220PF, 10%, 100V Mini	1005-0075	Erie	8101-A100-W5R0-221K
C36	Cap, 1000PF, 10%, 100V Min Cer	1005-0081	Erie	8121-100-W5R-102K
C37	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C38	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C39	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C40	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C41	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C42	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C43	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C44	Cap, 500μF, +100-10%, 25V	1014-0002	Ill. Elna	25T500
C45	Cap, 100μF, +75-10%, 12V	1013-0011	Sprague	30D107G012CC5

SLAVE PHASE LOCK LOOP, 2500 (cont)

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
C46	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C47	Cap, 68PF, 5%, 500V Mica	1002-0013	Elmenco	DM15-E-680J
C48	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C49	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C50	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C51	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Elmenco	5855-505-Y5U0-503Z
C52	Cap, .047μF, 10%, 100V	1008-0049	Sprague	225P47391WA3
C53	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C54	Cap, 620PF, 5%, 300V Mica	1002-0038	Elmenco	DM15-F-621J
C55	Cap, 100PF, 5%, 500V Mica	1002-0011	Elmenco	DM15-F-101J
C56	Cap, 1000PF, 5%, 100V Mica	1002-0015	Elmenco	DM15-F-102J
C57	Cap, 510PF, 5%, 500V Mica	1002-0036	Elmenco	DM15-F-511J
C58	Cap, 820PF, 5%, 300V Mica	1002-0039	Elmenco	DM15-F-821J
C59	Cap, 390PF, 5%, 500V Mica	1002-0033	Elmenco	DM15-F-391J
C60	Cap, 470PF, 5%, 500V Mica	1002-0035	Elmenco	DM15-F-471J
C61	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C62	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C63	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C64	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C65	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C66	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C67	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C68	Cap, .22MF, 10%, 100V Mylar	1008-0091	Electrocube	232A1B224K
C69	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C70	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C71	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C72	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C73	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C74	Cap, .1μF, 10%, 100V	1008-0031	Sprague	225P10491WA3
C75	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C76	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C77	Cap, 430PF, 5%, 500V Mica	1002-0034	Elmenco	DM15-F-431J
C78	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
	DIODES			
CR1	Diode, HPA2800	1283-0001	HPA	5082-2800
CR2	Diode, HPA2800	1283-0001	HPA	5082-2800
CR3	Diode, HPA2800	1283-0001	HPA	5082-2800
CR4	Diode, HPA2800	1283-0001	HPA	5082-2800
CR5	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR6	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR7	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR8	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR9	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR10	Diode, MV109 Varicap 29PF 30V. 4W Si	1281-0064	Motorola	MV109
CR11	Diode, MV109 Varicap 29PF 30V. 4W Si	1281-0064	Motorola	MV109
CR12	Diode, MV109 Varicap 29PF 30V. 4W Si	1281-0064	Motorola	MV109
CR13	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR14	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR15	Diode, 1N3064	1281-0013	Teledyne	1N3064

SLAVE PHASE LOCK LOOP, 2500 (cont)

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
CR16	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR17	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR18	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR19	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR20	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR21	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR22	Diode, 1N4733A	1281-0031	Motorola	1N4733A
CR23	Diode, 1N3064	1281-0013	Teledyne	1N3064
	INDUCTORS			
L1	Choke, 56μH, 5%, RF	1585-0042	Delevan	1537-64
L2	Choke, 1.5μH, 10%	1585-0038	Delevan	1537-16
L3	Choke, 1μH, 10%	1585-0027	Delevan	1537-12
L4	Choke, .22μH, 20%	1585-0039	Delevan	1537-02
L5	Choke, 1μH, 10%	1585-0027	Delevan	1537-12
L6	Choke, U-250, Ferrite Bead	1586-0004	Ferroxcube	56-590-65/4B
L7	Choke, 56μH, 5%, RF	1585-0042	Delevan	1537-64
L8	Choke, 1.5μH, 10%	1585-0038	Delevan	1537-16
L9	Choke, 1.5μH, 10%	1585-0038	Delevan	1537-16
L10	Coil, Variable IF (10 turn)	1596-8105	Cushman	
L11	Choke, 4.7μH, 10%	1585-0021	Delevan	1537-28
L12	Choke, 1μH, 10%	1585-0027	Delevan	1537-12
L13	Choke, 1μH, 10%	1585-0027	Delevan	1537-12
L14	Choke, 2 1/2 Turns Wide Band	1586-0003	VK	20020/4B
L15	Choke, 2 1/2 Turns Wide Band	1586-0003	VK	20020/4B
L16	Choke, 2 1/2 Turns Wide Band	1586-0003	VK	20020/4B
L17	Choke, 100μH, 5%	1585-0017	Delevan	1537-76
L18	Choke, 820μH, 5%	1585-0050	Delevan	2500-24
L19	Ch, 560μH, 5% RF Molded	1585-0083	Delevan	2500-16
L20	Ch, 560μH, 5% RF Molded	1585-0083	Delevan	2500-16
L21	Choke, 3.9μH, 10%	1585-0014	Delevan	1537-26
L22	Choke, 4700μH, 5%	1585-0006	Delevan	2500-60
	TRANSISTORS			
Q1	Trans, 2N3563	1272-0022	Fairchild	2N3563
Q2	Trans, 2N5179 (Motorola)	1272-0060	Motorola	2N5179
Q3	Trans, 2N5179 (Motorola)	1272-0060	Motorola	2N5179
Q4	Trans, 2N3563	1272-0022	Fairchild	2N3563
Q5	Trans, 2N3563	1272-0022	Fairchild	2N3563
Q6	Trans, 2N4249	1272-0024	Fairchild	2N4249
Q7	Trans, 2N4249	1272-0024	Fairchild	2N4249
Q8	Trans, 2N4249	1272-0024	Fairchild	2N4249
Q9	Trans, 2N4392	1272-0054	Teledyne	2N4392
Q10	Trans, 2N4392	1272-0054	Teledyne	2N4392
Q11	Trans, 2N4392	1272-0054	Teledyne	2N4392
Q12	Trans, 2N4392	1272-0054	Teledyne	2N4392

SLAVE PHASE LOCK LOOP, 2500 (cont)

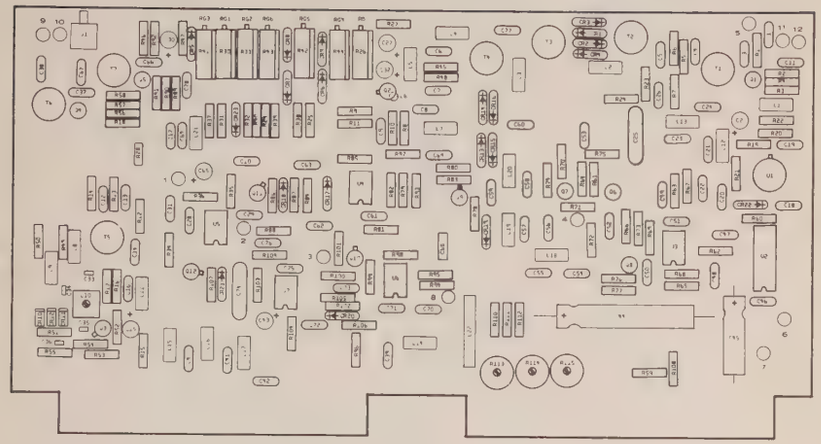
CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
	RESISTORS			
R1	Res, 47 Ohm, 5%, 1/4W Comp	1066-4705	Allen-Bradley	CB4705
R2	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025
R3	Res, 3.9K, 5%, 1/4W Comp	1066-3925	Allen-Bradley	CB3925
R4	Res, 8.2K, 5%, 1/4W Comp	1066-8225	Allen-Bradley	CB8225
R5	Res, 30 Ohm, 5%, 1/4W Comp	1066-3005	Allen-Bradley	CB3005
R6	Res, 30 Ohm, 5%, 1/4W Comp	1066-3005	Allen-Bradley	CB3005
R7	Res, 30 Ohm, 5%, 1/4W Comp	1066-3005	Allen-Bradley	CB3005
R8	Res, 3.3K, 5%, 1/4W Comp	1066-3325	Allen-Bradley	CB3325
R9	Res, 47 Ohm, 5%, 1/4W Comp	1066-4705	Allen-Bradley	CB4705
R10	Res, 3.9K, 5%, 1/4W Comp	1066-3925	Allen-Bradley	CB3925
R11	Res, 510 Ohm, 5%, 1/4W Comp	1066-5115	Allen-Bradley	CB5115
R12	Res, 51 Ohm, 5%, 1/4W Comp	1066-5105	Allen-Bradley	CB5105
R13	Res, 51 Ohm, 5%, 1/4W Comp	1066-5105	Allen-Bradley	CB5105
R14	Res, 51 Ohm, 5%, 1/4W Comp	1066-5105	Allen-Bradley	CB5105
R15	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R16	Res, 68 Oh m, 5%, 1/4W Comp	1066-6805	Allen-Bradley	CB6805
R17	Res, 150 Ohm, 5%, 1/4W Comp	1066-1515	Allen-Bradley	CB1515
R18	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R19	Res, 5.1 Ohm, 5%, 1/4W Comp	1066-0002	Allen-Bradley	CB0002
R20	Res, 100K, 5%, 1/4W Carbon Comp	1066-1045	Allen-Bradley	CB1045
R21	Res, 5.1 Ohm, 5%, 1/4W Comp	1066-0002	Allen-Bradley	CB0002
R22	Res, 51.1 Ohm, 1%, 1/8W MF	1075-0077	Dale	MF 1/8
R23	Res, 24 Ohm, 5%, 1/4W Comp	1066-2405	Allen-Bradley	CB2405
R24	Res, 120 Ohm, 5%, 1/4W Comp	1066-1215	Allen-Bradley	CB1215
R25	Res, 22K, 5%, 1/4W Comp	1066-2235	Allen-Bradley	CB2235
R26	Pot, 20K, 10%, 3/4W	1215-0021	Beckman	89WR
R27	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R28	Thrmis, 1K	1253-0002	Veco	31E2
R29	Res, 560 Ohm, 5%, 1/4W Comp	1066-5615	Allen-Bradley	CB5615
R30	Pot, 50K, 10%, 3/4W	1215-0023	Beckman	89WR
R31	Res, 6.8K, 5%, 1/4W Comp	1066-6825	Allen-Bradley	CB6825
R32	Res, 22K, 5%, 1/4W Comp	1066-2235	Allen-Bradley	CB2235
R33	Pot, 100K, 10%, 3/4W	1215-0006	Helitrim	89WR
R34	Res, 10 Ohm, 5%, 1/4W Comp	1066-1005	Allen-Bradley	CB1005
R35	Res, 10 Ohm, 5%, 1/4W Comp	1066-1005	Allen-Bradley	CB1005
R36	Res, 10K, 1%, 1/8W MF	1075-0009	Dale	MF 1/8
R37	Res, 22K, 5%, 1/4W Comp	1066-2235	Allen-Bradley	CB2235
R38	Res, 43K, 5%, 1/4W Carbon Comp	1066-4335	Allen-Bradley	CB4335
R39	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R40	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025
R41	Pot, 100K, 10%, 3/4W	1215-0006	Helitrim	89WR
R42	Pot, 50K, 10%, 3/4W	1215-0023	Beckman	89WR
R43	Pot, 10K, 10%, 3/4W	1215-0014	Beckman	89WR
R44	Pot, 50K, 10%, 3/4W	1215-0023	Beckman	89WR
R45	Res, 3.9K, 5%, 1/4W Comp	1066-3925	Allen-Bradley	CB3925
R46	Res, 3.6K, 5%, 1/4W Comp	1066-3625	Allen-Bradley	CB3625
R47	Res, 15K, 5%, 1/4W Comp	1066-1535	Allen-Bradley	CB1535
R48	Res, 12K, 5%, 1/4W Comp	1066-1235	Allen-Bradley	CB1235
R49	Res, 220 Ohm, 5%, 1/4W Comp	1066-2215	Allen-Bradley	CB2215
R50	Res, 220 Ohm, 5%, 1/4W Comp	1066-2215	Allen-Bradley	CB2215

SLAVE PHASE LOCK LOOP, 2500 (cont)

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R51	Res, 100K, 5%, 1/4W Carbon Comp	1066-1045	Allen-Bradley	CB1045
R52	Res, 15K, 5%, 1/4W Comp	1066-1535	Allen-Bradley	CB1535
R53	Res, 4.7K, 5%, 1/4W Comp	1066-4725	Allen-Bradley	CB4725
R54	Res, 2.7 Ohm, 5%, 1/4W Comp	1066-0007	Allen-Bradley	CB0007
R55	Res, 220 Ohm, 5%, 1/4W Comp	1066-2215	Allen-Bradley	CB2215
R56	Res, 2K, 5%, 1/4W Comp	1066-2025	Allen-Bradley	CB2025
R57	Res, 3.9K, 5%, 1/4W Comp	1066-3925	Allen-Bradley	CB3925
R58	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R59	Res, 5.1 Ohm, 5%, 1/4W Comp	1066-0002	Allen-Bradley	CB0002
R60	Res, 4.32K, 1%, 1/8W MF	1075-0111	Dale	MF 1/8
R61	Res, 6.2K, 5%, 1/4W Comp	1066-6225	Allen-Bradley	CB6225
R62	Res, 4.32K, 1%, 1/8W MF	1075-0111	Dale	MF 1/8
R63	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R64	Res, 8.2K, 5%, 1/4W Comp	1066-8225	Allen-Bradley	CB8225
R65	Res, 51.1K, 1%, 1/8W MF	1075-0099	Dale	MF 1/8
R66	Res, 681 Ohm, 1%, 100 PPM Film	1075-0164	Dale	MF 1/8
R67	Res, 1.62K, 1%, 1/8W MF	1075-0070	Dale	MF 1/8
R68	Res, 383K, 1%, 1/8W MF	1075-0115	Dale	MF 1/8
R69	Res, 470 Ohm, 5%, 1/4W Comp	1066-4715	Allen-Bradley	CB4715
R70	Res, 2.7K, 5%, 1/4W Comp	1066-2725	Allen-Bradley	CB2725
R71	Res, 15K, 5%, 1/4W Comp	1066-1535	Allen-Bradley	CB1535
R72	Res, 1K, 1%, 1/8W MF	1075-0037	Dale	MF 1/8
R73	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R74	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R75	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R76	Res, 100K, 5%, 1/4W Carbon Comp	1066-1045	Allen-Bradley	CB1045
R77	Res, 1 Meg, 5%, 1/4W Comp	1066-1055	Allen-Bradley	CB1055
R78	Res, 1 Meg, 5%, 1/4W Comp	1066-1055	Allen-Bradley	CB1055
R79	Res, 17.8K, 1%, 1/10W MF	1074-1021	Dale	MF 1/10
R80	Res, 36.5K, 1%, 1/8W MF	1075-0113	Dale	MF 1/8
R81	Res, 10 Ohm, 5%, 1/4W Comp	1066-1005	Allen-Bradley	CB1005
R82	Res, 4.75K, 1%, 1/8W MF	1075-0038	Dale	MF 1/8
R83	Res, 10K, 1%, 1/8W MF	1075-0009	Dale	MF 1/8
R84	Res, 10 Ohm, 5%, 1/4W Comp	1066-1005	Allen-Bradley	CB1005
R85	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R86	Res, 1 Meg, 5%, 1/4W Comp	1066-1055	Allen-Bradley	CB1055
R87	Res, 15K, 5%, 1/4W Comp	1066-1535	Allen-Bradley	CB1535
R88	Res, 15K, 5%, 1/4W Comp	1066-1535	Allen-Bradley	CB1535
R89	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R90	Res, 2K, 5%, 1/4W Comp	1066-2025	Allen-Bradley	CB2025
R91	Res, 3.9K, 5%, 1/4W Comp	1066-3925	Allen-Bradley	CB3925
R92	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R93	Res, 100K, 1%, 1/8W MF	1075-0105	Dale	MF 1/8
R94	Res, 20K, 1%, 1/8W MF	1075-0096	Dale	MF 1/8
R95	Res, 6.2K, 5%, 1/4W Comp	1066-6225	Allen-Bradley	CB6225
R96	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R97	Res, 2K, 5%, 1/4W Comp	1066-2025	Allen-Bradley	CB2025
R98	Res, 20K, 1%, 1/8W MF	1075-0096	Dale	MF 1/8
R99	Res, 1 Meg, 5%, 1/4W Comp	1066-1055	Allen-Bradley	CB1055
R100	Res, 10K, 1%, 1/8W MF	1075-0009	Dale	MF 1/8

SLAVE PHASE LOCK LOOP, 2500 (cont)

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R101	Res, 22K, 5%, 1/4W Comp	1066-2235	Allen-Bradley	CB2235
R102	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R103	Res, 10K, 1%, 1/8W MF	1075-0009	Dale	MF 1/8
R104	Res, 7.5K, 5%, 1/4W Comp	1066-7525	Allen-Bradley	CB7525
R105	Res, 51.1K, 1%, 1/8W MF	1075-0099	Dale	MF 1/8
R106	Res, 10 Ohm, 5%, 1/4W Comp	1066-1005	Allen-Bradley	CB1005
R107	Res, 1 Meg, 5%, 1/4W Comp	1066-1055	Allen-Bradley	CB1055
R108	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R109	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R110	Res, 16.2K, 1%, 1/8W	1075-0057	Dale	MF 1/8
R111	Res, 39.2K, 1%, 1/10W MF	1074-1032	Dale	MF 1/10
R112	Res, 130K, 1%, 1/8W MF	1075-0114	Dale	MF 1/8
R113	Pot, 5K, 20%, 1/2W	1203-0054	Bourns	3339H-1-502
R114	Pot, 20K, 20%, 1/2W	1203-0055	Bourns	3339H-1-203
R115	Pot, 50K, 20%, 1/2W	1203-0059	Bourns	3339H-1-503
	TRANSFORMERS			
T1	Assy, Trifilar Coil	1579-0017	Cushman	
T2	Assy, Trifilar Coil	1579-0017	Cushman	
T3	Assy, Trifilar Coil	1579-0017	Cushman	
T4	Assy, Trifilar Coil	1579-0017	Cushman	
T5	Assy, Trifilar Coil	1579-0017	Cushman	
T6	Assy, Trifilar Coil	1579-0017	Cushman	
T7	Assy, Trifilar Coil	1579-0017	Cushman	
	INTEGRATED CIRCUITS			
U1	IC, UA710C Hi Spd Diff. Comparator	2025-0028	Fairchild	U5B771039X
U2	IC, MC4044P Phase Detector	2025-0066	Motorola	MC4044P
U3	IC, SN72741P	2025-0067	T.I.	SN72741P
U4	IC, SN72741P	2025-0067	T.I.	SN72741P
U5	IC, SN72741P	2025-0067	T.I.	SN72741P
U6	IC, SN72741P	2025-0067	T.I.	SN72741P
U7	IC, SN72741P	2025-0067	T.I.	SN72741P



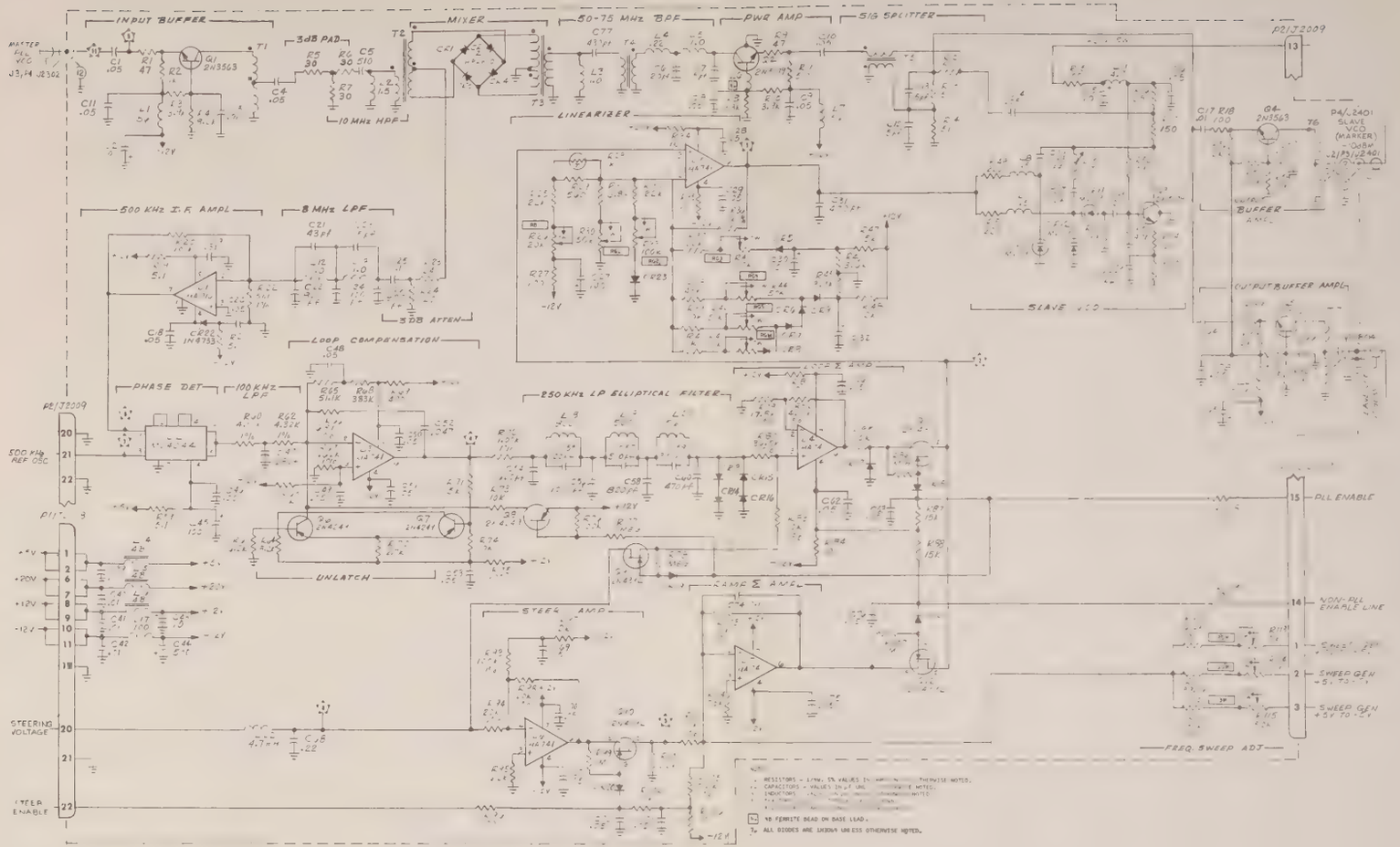


Figure 3-10. Slave Phase Lock Loop, 2500

5601**0069

80 kHz BAND PASS FILTER, 2600

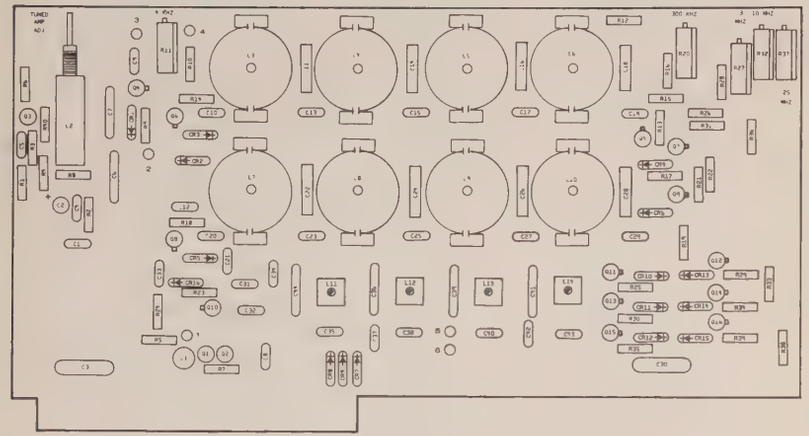
CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
2600	PCB Assy, 80 kHz BPF	7001-0421	Cushman	
	PC Board	1780-0567	Cushman	
	CAPACITORS			
C1	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C2	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C3	Cap, .27μF, 10%, 100V	1008-0028	Sprague	225P27491YA-1
C4	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C5	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C6	Cap, 10000PF, 5%, 500V Mica	1002-0086	Elmenco	DM30-F-103J
C7	Cap, 6200PF, 5%, 300V Mica	1002-0085	Elmenco	DM19-F-622J
C8	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C9	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C10	Cap, 390PF, 5%, 500V Mica	1002-0033	Elmenco	DM15-F-391J
C11	Cap, 5220PF, 1%, 100V	1008-0075	IMB	PA1B5221F
C12	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C13	Cap, 36PF, 5%, 500V Mica	1002-0041	Elmenco	DM15-E-360J
C14	Cap, 5590PF, 1%, 100V	1008-0079	IMB	PA1B5591F
C15	Cap, 27PF, 5%, 500V Mica	1002-0008	Elmenco	DM15-E-270J
C16	Cap, 5610PF, 1%, 100V	1008-0080	IMB	PA1B5611F
C17	Cap, 18PF, 5%, 500V Mica	1002-0014	Elmenco	DM15-C-180J
C18	Cap, 5360PF, 1%, 100V	1008-0076	IMB	PA1B5361F
C19	Cap, 270PF, 5%, 500V Mica	1002-0031	Elmenco	DM15-F-271J
C20	Cap, 680PF, 5%, 300V Mica	1002-0022	Elmenco	DM15-F-681J
C21	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C22	Cap, 4850PF, 1%, 100V	1008-0073	IMB	PA1B4851F
C23	Cap, 150PF, 5%, 500V Mica	1002-0021	Elmenco	DM15-F-151J
C24	Cap, 5420PF, 1%, 100V	1008-0077	IMB	PA1B5421F
C25	Cap, 96PF, 1%, 500V Mica	1002-0049	Elmenco	DM15-F960F
C26	Cap, 5490PF, 1%, 100V	1008-0078	IMB	PA1B5491F
C27	Cap, 68PF, 5%, 500V Mica	1002-0013	Elmenco	DM15-E-680J
C28	Cap, 5060PF, 1%, 100V	1008-0074	IMB	PA1B5061F
C29	Cap, 560PF, 5%, 300V Mica	1002-0037	Elmenco	DM15-F-561J
C30	Cap, .27μF, 10%, 100V	1008-0028	Sprague	225P27491YA-1
C31	Cap, 220PF, 5%, 500V Mica	1002-0029	Elmenco	DM15-F-221J
C32	Cap, 1100PF, 5%, 500V Mica	1002-0071	Elmenco	DM19-F-112J
C33	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C34	Cap, 300PF, 5%, 500V Mica	1002-0059	Elmenco	DM15-E-301J
C35	Cap, 470PF, 5%, 500V Mica	1002-0035	Elmenco	DM15-F-471J
C36	Cap, 4300PF, 5%, 500V Dip Mica	1002-0089	Elmenco	DM19-F-432J
C37	Cap, 200PF, 5%, 500V Mica	1002-0042	Elmenco	DM15-F-201J
C38	Cap, 300PF, 5%, 500V Mica	1002-0059	Elmenco	DM15-E-301J
C39	Cap, 4700PF, 5%, 500V Mica	1002-0070	Elmenco	DM19-F-472J
C40	Cap, 220PF, 5%, 500V Mica	1002-0029	Elmenco	DM15-F-221J
C41	Cap, 3900PF, 5%, 500V Mica	1002-0079	Elmenco	DM19-F-392J
C42	Cap, 270PF, 5%, 500V Mica	1002-0031	Elmenco	DM15-F-271J
C43	Cap, 910PF, 5%, 100V Mica	1002-0062	Elmenco	DM15-F-911J
C44	Cap, 3300PF, 5%, 500V Mica	1002-0069	Elmenco	DM19-F-332J

80 kHz BAND PASS FILTER, 2600 (cont)

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
	DIODES			
CR1	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR2	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR3	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR4	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR5	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR6	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR7	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR8	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR9	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR10	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR11	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR12	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR13	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR14	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR15	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR16	Diode, 1N3064	1281-0013	Teledyne	1N3064
	INDUCTORS			
L1	Choke, 22MH, 15%	1585-0029	Delevan	2534-56
L2	Coil, 570μH, 1.25MH	1596-0033	Delevan	4000-42
L3	Assy, Inductor, Pot Core .665MH-.735MH	1596-0065	Cushman	
L4	Assy, Inductor, Pot Core .665MH-.735MH	1596-0065	Cushman	
L5	Assy, Inductor, Pot Core .665MH-.735MH	1596-0065	Cushman	
L6	Assy, Inductor, Pot Core .665MH-.735MH	1596-0065	Cushman	
L7	Assy, Inductor, Pot Core .665MH-.735MH	1596-0065	Cushman	
L8	Assy, Inductor, Pot Core .665MH-.735MH	1596-0065	Cushman	
L9	Assy, Indcutor, Pot Core .665MH-.735MH	1596-0065	Cushman	
L10	Assy, Inductor, Pot Core .665MH-.735MH	1596-0065	Cushman	
L11	Coil Assy, Var IF	1596-0245	Cushman	
L12	Coil Assy, Var IF	1596-0245	Cushman	
L13	Coil Assy, Var IF	1596-0245	Cushman	
L14	Coil Assy, Var IF	1596-0245	Cushman	
	TRANSISTORS			
Q1	Trans, 2N4275	1272-0016	Fairchild	2N4275
Q2	Trans, 2N4275	1272-0016	Fairchild	2N4275
Q3	Trans, 2N3563	1272-0022	Fairchild	2N3563
Q4	Trans, 2N4391	1272-0042	Teledyne	2N4391
Q5	Trans, 2N4391	1272-0042	Teledyne	2N4391

80 kHz BAND PASS FILTER, 2600 (cont)

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
Q6	Trans, 2N4391	1272-0042	Teledyne	2N4391
Q7	Trans, 2N4391	1272-0042	Teledyne	2N4391
Q8	Trans, 2N4391	1272-0042	Teledyne	2N4391
Q9	Trans, 2N4391	1272-0042	Teledyne	2N4391
Q10	Trans, 2N4391	1272-0042	Teledyne	2N4391
Q11	Trans, 2N4391	1272-0042	Teledyne	2N4391
Q12	Trans, 2N4391	1272-0042	Teledyne	2N4391
Q13	Trans, 2N4391	1272-0042	Teledyne	2N4391
Q14	Trans, 2N4391	1272-0042	Teledyne	2N4391
Q15	Trans, 2N4391	1272-0042	Teledyne	2N4391
Q16	Trans, 2N4391	1272-0042	Teledyne	2N4391
	RESISTORS			
R1	Res, 620 Ohm, 5%, 1/4W Comp	1066-6215	Allen-Bradley	CB6215
R2	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB6215
R3	Res, 15K, 5%, 1/4W Comp	1066-1535	Allen-Bradley	CB6215
R4	Res, 3.3K, 5%, 1/4W Comp	1066-3325	Allen-Bradley	CB3325
R5	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R6	Res, 1.43K, 1%, 1/8W MF	1075-0021	Dale	MF 1/8
R7	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R8	Res, 56K, 5%, 1/4W Comp	1066-5635	Allen-Bradley	CB5635
R9	Res, 1 Meg, 5%, 1/4W Comp	1066-1055	Allen-Bradley	CB1055
R10	Res, 1.2K, 5%, 1/4W Comp	1066-1225	Allen-Bradley	CB1225
R11	Pot, 1K, 10%, 3/4W	1215-0013	Helitrim	89WR
R12	Res, 510 Ohm, 5%, 1/4W Comp	1066-5115	Allen-Bradley	CB5115
R13	Res, 1 Meg, 5%, 1/4W Comp	1066-1055	Allen-Bradley	CB5115
R14	Res, 1 Meg, 5%, 1/4W Comp	1066-1055	Allen-Bradley	CB5115
R15	Res, 200 Ohm, 5%, 1/4W Comp	1066-2015	Allen-Bradley	CB2015
R16	Res, 1.2K, 5%, 1/4W Comp	1066-1225	Allen-Bradley	CB1225
R17	Res, 1 Meg, 5%, 1/4W Comp	1066-1055	Allen-Bradley	CB1055
R18	Res, 1 Meg, 5%, 1/4W Comp	1066-1055	Allen-Bradley	CB1055
R19	Res, 1.2K, 5%, 1/4W Comp	1066-1225	Allen-Bradley	CB1225
R20	Pot, 1K, 10%, 3/4W	1215-0013	Helitrim	89WR
R21	Res, 1 Meg, 5%, 1/4W Comp	1066-1055	Allen-Bradley	CB1055
R22	Res, 1.2K, 5%, 1/4W Comp	1066-1225	Allen-Bradley	CB1225
R23	Res, 1 Meg, 5%, 1/4W Comp	1066-1055	Allen-Bradley	CB1055
R24	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R25	Res, 1 Meg, 5%, 1/4W Comp	1066-1055	Allen-Bradley	CB1055
R26	Res, 2.4K, 5%, 1/4W Comp	1066-2425	Allen-Bradley	CB2425
R27	Pot, 1K, 10%, 3/4W	1215-0013	Helitrim	89WR
R28	Res, 2.4K, 5%, 1/4W Comp	1066-2425	Allen-Bradley	CB2425
R29	Res, 1 Meg, 5%, 1/4W Comp	1066-1055	Allen-Bradley	CB1055
R30	Res, 1 Meg, 5%, 1/4W Comp	1066-1055	Allen-Bradley	CB1055
R31	Res, 2.4K, 5%, 1/4W Comp	1066-2425	Allen-Bradley	CB2425
R32	Pot, 1K, 10%, 3/4W	1215-0013	Helitrim	89WR
R33	Res, 2.4K, 5%, 1/4W Comp	1066-2425	Allen-Bradley	CB2425
R34	Res, 1 Meg, 5%, 1/4W Comp	1066-1055	Allen-Bradley	CB1055
R35	Res, 1 Meg, 5%, 1/4W Comp	1066-1055	Allen-Bradley	CB1055
R36	Res, 2.4K, 5%, 1/4W Comp	1066-2425	Allen-Bradley	CB2425
R37	Pot, 1K, 10%, 3/4W	1215-0013	Helitrim	89WR
R39	Res, 2.4K, 5%, 1/4W Comp	1066-2425	Allen-Bradley	CB2425
R39	Res, 1 Meg, 5%, 1/4W Comp	1066-1055	Allen-Bradley	CB2425
R40	Res, 6.2K, 5%, 1/4W Comp	1066-6225	Allen-Bradley	CB2425



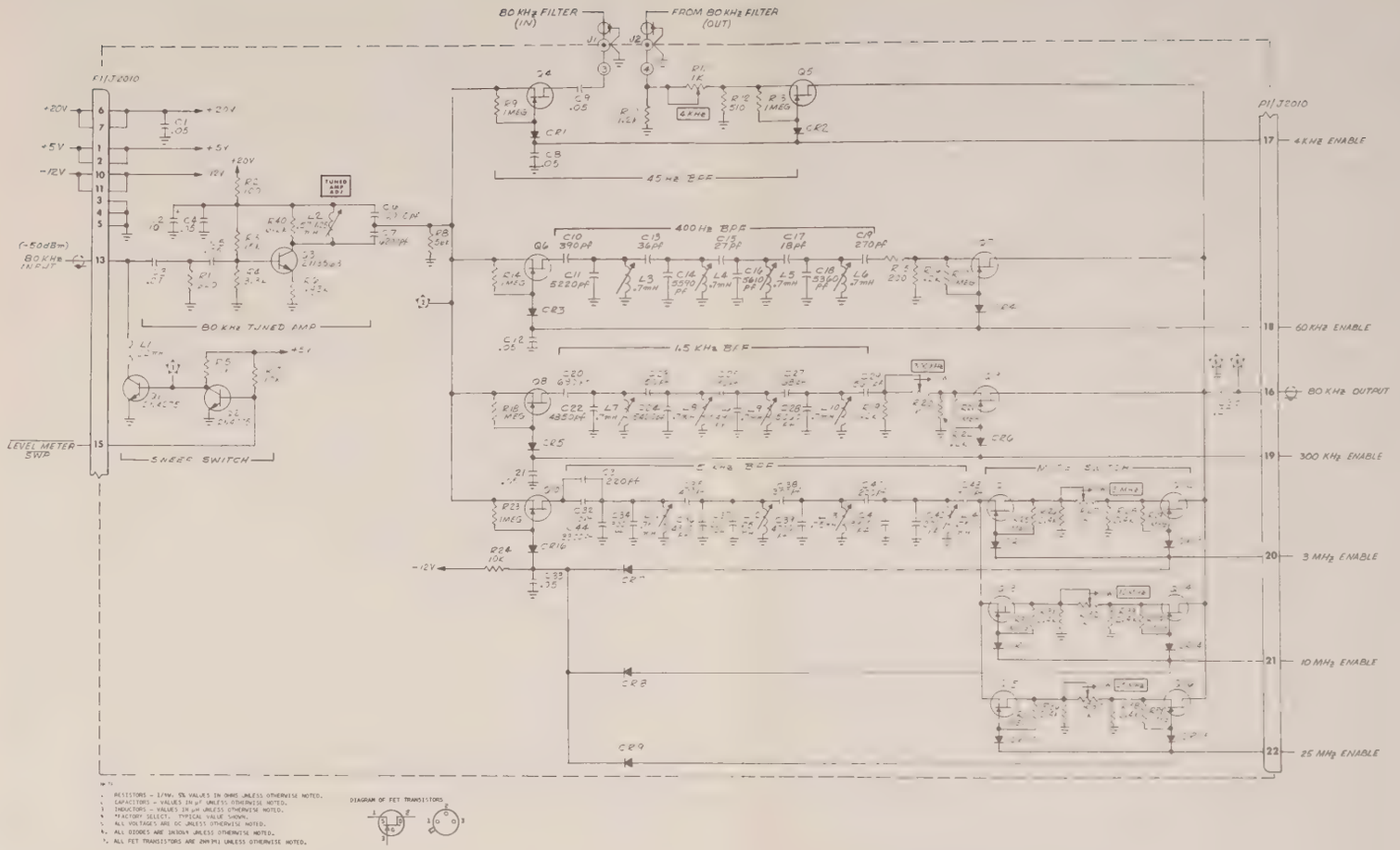


Figure 3-11. 80 kHz Band Pass Filter, 2600

SWEEP GENERATOR, 2700

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
2700	PCB Assy, Sweep Gen	7001-0422	Cushman	
	PC Board	1780-0574	Cushman	
	CAPACITORS			
C1	Cap, 3.3μF, 10%, 15V	1011-0008	Kemet	K3R3C15K
C2	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C3	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C4	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C5	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C6	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C7	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C8	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C9	Cap, 2.0μF, 10%, 100V	1008-0063	Elpac	ZA-100V
C10	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C11	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C12	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C13	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C14	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C15	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C16	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C17	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C18	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C19	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C20	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C21	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C22	Cap, .1μF, 10%, 100V	1008-0031	Sprague	225P10491WA3
C23	Cap, .01μF, 10%, 200V	1005-0065	Aerovox	CK06BX103K
C24	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C25	Cap, 100PF, 5%, 500V Mica	1002-0011	Elmenco	DM15-F-101J
C26	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C27	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C28	Cap, 470PF, 5%, 500V Mica	1002-0035	Elmenco	DM15-F-471J
C29	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C30	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C31	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C32	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C33	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C34	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C35	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C36	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C37	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C38	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
	DIODES			
CR1	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR2	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR3	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR4	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR5	Diode, 1N3064	1281-0013	Teledyne	1N3064

SWEEP GENERATOR, 2700 (cont)

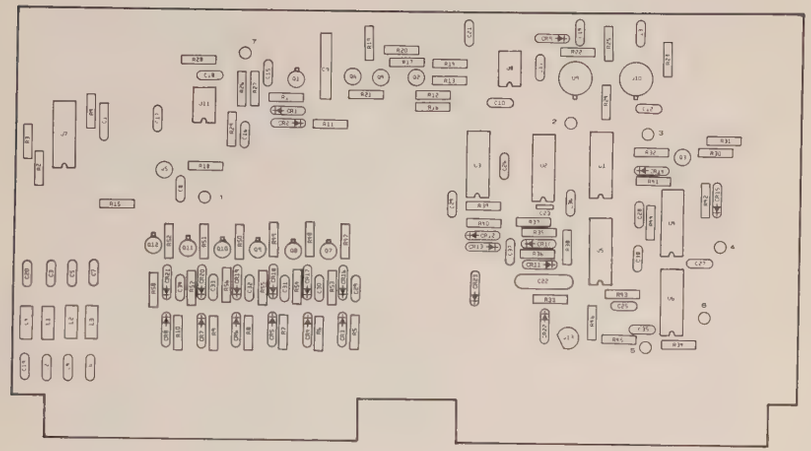
CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
CR6	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR7	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR8	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR9	Diode, 1N4737	1281-0026	I. R.	1N4737A
CR10	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR11	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR12	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR13	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR14	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR15	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR16	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR17	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR18	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR19	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR20	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR21	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR22	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR23	Diode, 1N3064	1281-0013	Teledyne	1N3064
	INDUCTORS			
L1	Choke, 100μH, 5%	1585-0017	Delevan	1537-76
L2	Choke, 100μH, 5%	1585-0017	Delevan	1537-76
L3	Choke, 100μH, 5%	1585-0017	Delevan	1537-76
L4	Choke, 100μH, 5%	1585-0017	Delevan	1537-76
	TRANSISTORS			
Q1	Trans, 2N4391	1272-0042	Teledyne	2N4391
Q2	Trans, 2N4249	1272-0024	Fairchild	2N4249
Q3	Trans, 2N4275	1272-0016	Fairchild	2N4275
Q4	Trans, 2N4275	1272-0016	Fairchild	2N4275
Q5	Trans, 2N4249	1272-0024	Fairchild	2N4249
Q6	Trans, 2N4275	1272-0016	Fairchild	2N4275
Q7	Trans, 2N4393	1272-0055	Teledyne	2N4393
Q8	Trans, 2N4393	1272-0055	Teledyne	2N4393
Q9	Trans, 2N4393	1272-0055	Teledyne	2N4393
Q10	Trans, 2N4393	1272-0055	Teledyne	2N4393
Q11	Trans, 2N4393	1272-0055	Teledyne	2N4393
Q12	Trans, 2N4393	1272-0055	Teledyne	2N4393
Q13	Trans, 2N3567	1272-0014	Fairchild	2N3567
	RESISTORS			
R1	Res, 1 Meg, 5%, 1/4W Comp	1066-1055	Allen-Bradley	CB1055
R2	Res, 2.7K, 5%, 1/4W Comp	1066-2725	Allen-Bradley	CB2725
R3	Res, 2.7K, 5%, 1/4W Comp	1066-2725	Allen-Bradley	CB2725
R4	Res, 510 Ohm, 5%, 1/4W Comp	1066-5115	Allen-Bradley	CB5115
R5	Res, 768K, 1%, 100 PPM Film	1075-0146	Dale	MF 1/8
R6	Res, 274K, 1%, 1/8W MF	1075-0062	Dale	MF 1/8
R7	Res, 110K, 1%, 100 PPM Film	1075-0162	Dale	MF 1/8
R8	Res, 110K, 1%, 100 PPM Film	1075-0162	Dale	MF 1/8
R9	Res, 110K, 1%, 100 PPM Film	1075-0162	Dale	MF 1/8
R10	Res, 640K, 1%, 1/8W MF	1075-0033	Dale	MF 1/8

SWEEP GENERATOR, 2700 (cont)

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R11	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R12	Res, 1.8K, 5%, 1/4W Comp	1066-1825	Allen-Bradley	CB1825
R13	Res, 4.7K, 5%, 1/4W Comp	1066-4725	Allen-Bradley	CB4725
R14	Res, 22K, 5%, 1/4W Comp	1066-2235	Allen-Bradley	CB2235
R15	Res, 11.3K, 1%, 1/8W MF	1075-0034	Dale	MF 1/8
R16	Res, 620 Ohm, 5%, 1/4W Comp	1066-6215	Allen-Bradley	CB6215
R17	Res, 15K, 5%, 1/4W Comp	1066-1535	Allen-Bradley	CB6215
R18	Res, 18.2K, 1%, 1/8W MF	1075-0075	Dale	MF 1/8
R19	Res, 4.32K, 1%, 1/8W MF	1075-0111	Dale	MF 1/8
R20	Res, 7.68K, 1%, 1/8W MF	1075-0054	Dale	MF 1/8
R21	Res, 27.4K, 1%, 1/10W MF	1074-1004	Dale	MF 1/10
R22	Res, 10K, 1%, 1/8W MF	1075-0009	Dale	MF 1/8
R23	Res, 10K, 1%, 1/8W MF	1075-0009	Dale	MF 1/8
R24	Res, 8.25K, 1%, 1/8W MF	1075-0014	Dale	MF 1/8
R25	Res, 5.9K, 1%, 1/8W MF	1075-0110	Dale	MF 1/8
R26	Res, 5.62K, 1%, 1/8W MF	1075-0013	Dale	MF 1/8
R27	Res, 13.7K, 1%, 100 PPM Film	1075-0154	Dale	MF 1/8
R28	Res, 6.19K, 1%, 1/8W MF	1075-0109	Dale	MF 1/8
R29	Res, 15K, 5%, 1/4W Comp	1066-1535	Allen-Bradley	CB1535
R30	Res, 20K, 5%, 1/4W Comp	1066-2035	Allen-Bradley	CB2035
R31	Res, 4.7K, 5%, 1/4W Comp	1066-4725	Allen-Bradley	CB4725
R32	Res, 4.7K, 5%, 1/4W Comp	1066-4725	Allen-Bradley	CB4725
R33	Res, 3.9K, 5%, 1/4W Comp	1066-3925	Allen-Bradley	CB3925
R34	Res, 4.7K, 5%, 1/4W Comp	1066-4725	Allen-Bradley	CB4725
R35	Res, 3.9K, 5%, 1/4W Comp	1066-3925	Allen-Bradley	CB3925
R36	Res, 3.9K, 5%, 1/4W Comp	1066-3925	Allen-Bradley	CB3925
R37	Res, 3.9K, 5%, 1/4W Comp	1066-3925	Allen-Bradley	CB3925
R38	Res, 2.7K, 5%, 1/4W Comp	1066-2725	Allen-Bradley	CB2725
R39	Res, 3.9K, 5%, 1/4W Comp	1066-3925	Allen-Bradley	CB3925
R40	Res, 3.9K, 5%, 1/4W Comp	1066-3925	Allen-Bradley	CB3925
R41	Res, 3.9K, 5%, 1/4W Comp	1066-3925	Allen-Bradley	CB3925
R42	Res, 4.7K, 5%, 1/4W Comp	1066-4725	Allen-Bradley	CB4725
R43	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025
R44	Res, 470 Ohm, 5%, 1/4W Comp	1066-4715	Allen-Bradley	CB4715
R45	Res, 270 Ohm, 5%, 1/4W Comp	1066-2715	Allen-Bradley	CB2715
R46	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025
R47	Res, 1 Meg, 5%, 1/4W Comp	1066-1055	Allen-Bradley	CB1055
R48	Res, 1 Meg, 5%, 1/4W Comp	1066-1055	Allen-Bradley	CB1055
R49	Res, 1 Meg, 5%, 1/4W Comp	1066-1055	Allen-Bradley	CB1055
R50	Res, 1 Meg, 5%, 1/4W Comp	1066-1055	Allen-Bradley	CB1055
R51	Res, 1 Meg, 5%, 1/4W Comp	1066-1055	Allen-Bradley	CB1055
R52	Res, 1 Meg, 5%, 1/4W Comp	1066-1055	Allen-Bradley	CB1055
R53	Res, 15K, 5%, 1/4W Comp	1066-1535	Allen-Bradley	CB1535
R54	Res, 15K, 5%, 1/4W Comp	1066-1535	Allen-Bradley	CB1535
R55	Res, 15K, 5%, 1/4W Comp	1066-1535	Allen-Bradley	CB1535
R56	Res, 15K, 5%, 1/4W Comp	1066-1535	Allen-Bradley	CB1535
R57	Res, 15K, 5%, 1/4W Comp	1066-1535	Allen-Bradley	CB1535
R58	Res, 15K, 5%, 1/4W Comp	1066-1535	Allen-Bradley	CB1535

SWEEP GENERATOR, 2700 (cont)

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
	INTEGRATED CIRCUITS			
U1	IC, SN7400N, TTL Nand Gate	2025-0003	T.I.	SN7400N
U2	IC, SN7400N, TTL Nand Gate	2025-0003	T.I.	SN7400N
U3	IC, SN7400N, TTL Nand Gate	2025-0003	T.I.	SN7400N
U4	IC, SN7400N, TTL Nand Gate	2025-0003	T.I.	SN7400N
U5	IC, SN7476N, TTL Dual Flip Flop	2025-0005	T.I.	SN7476N
U6	IC, SN7400N, TTL Nand Gate	2025-0003	T.I.	SN7400N
U7	IC, SN7400N, TTL Nand Gate	2025-0003	T.I.	SN7400N
U8	IC, SN72741P	2025-0067	T.I.	SN72741P
U9	IC, UA710C Hi Spd Diff. Comparator	2025-0028	Fairchild	U5B771039X
U10	IC, UA710C Hi Spd Diff. Comparator	2025-0028	Fairchild	U5B771039X
U11	IC, SN72741P	2025-0067	T.I.	SN72741P



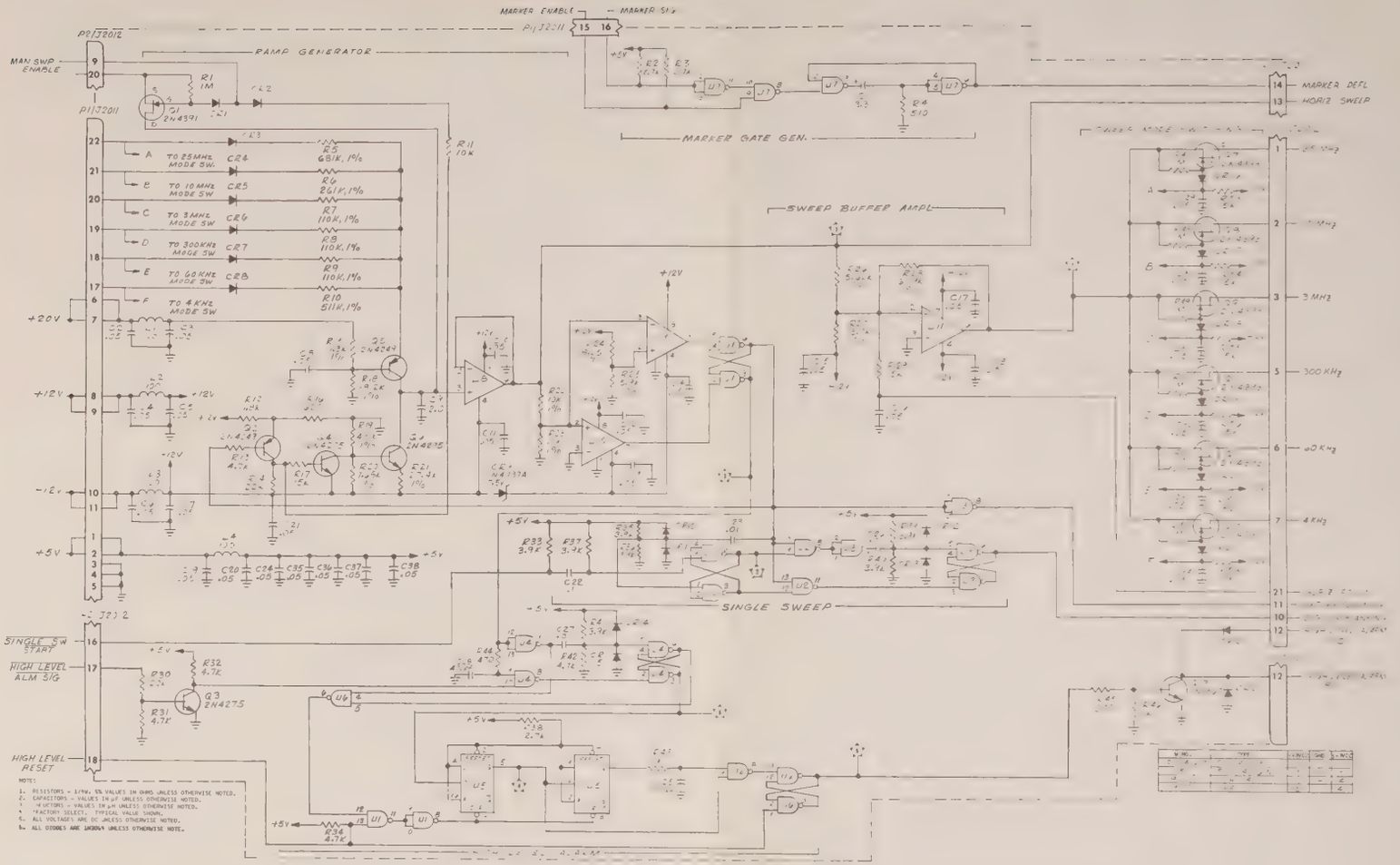

MARKER ENABLE
MARKER SIG
P1J32011
P1J32012
RAMP GENERATOR
MAN SWP ENABLE
TO 25MHz MODE SW.
TO 10MHz MODE SW
TO 3MHz MODE SW
TO 300KHz MODE SW
TO 60KHz MODE SW
TO 4KHz MODE SW
MARKER GATE GEN.
SWEEP BUFFER AMPL
SINGLE SWEEP
SINGLE SW START
HIGH LEVEL ALM SIG
HIGH LEVEL RESET
MARKER DEFL
HORIZ SWEEP
NOTE:
1. RESISTORS - 1/4W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.
2. CAPACITORS - VALUES IN μF UNLESS OTHERWISE NOTED.
3. INDUCTORS - VALUES IN μH UNLESS OTHERWISE NOTED.
4. *FACTORY SELECT. TYPICAL VALUE SHOWN.
5. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.
6. ALL DIODES ARE 1N3064 UNLESS OTHERWISE NOTE.

Figure 3-12. Sweep Generator, 2700

R. F. SWITCH, 2800

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
2800	PCB Assy, RF Switch	7001-0423	Cushman	
	PC Board	1780-0571	Cushman	
	CAPACITORS			
C1	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C2	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C3	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C4	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C5	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C6	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C7	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C8	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C9	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C10	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C11	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C12	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C13	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C14	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C15	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C16	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C17	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C18	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C19	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C20	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C21	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C22	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C23	Cap, 1.5PF, .25PF%, 500V Tub.	1005-0041	Erie	301-000-C0K0-159C
C24	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C25	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C26	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C27	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C28	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C29	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C30	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C31	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C32	Cap, 10PF, 5%, 500V Mica	1002-0016	Elmenco	DM15-C-100J
C33	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C34	Cap, 10PF, 5%, 500V Mica	1002-0016	Elmenco	DM15-C-100J
C35	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C36	Cap, 10PF, 5%, 500V Mica	1002-0016	Elmenco	DM15-C-100J
C37	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C38	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C39	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C40	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C41	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C42	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C43	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C44	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C45	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z

R. F. SWITCH, 2800 (cont)

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
C46	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C47	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C48	Cap, 10PF, 5%, 500V Mica	1002-0016	Elmenco	DM15-C-100J
C49	Cap, 10PF, 5%, 500V Mica	1002-0016	Elmenco	DM15-C-100J
C50	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C51	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C52	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C53	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C54	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C55	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C56	Cap, 10PF, 5%, 500V Mica	1002-0016	Elmenco	DM15-C-100J
C57	Cap, 10PF, 5%, 500V Mica	1002-0016	Elmenco	DM15-C-100J
C58	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C59	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C60	Cap, 1.5PF, .25PF%, 500V Tub.	1005-0041	Erie	301-000-C0K0-159C
C61	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C62	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C63	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C64	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C65	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
C66	Cap, .01μF, +80-20%, 25V Disc	1005-0013	Erie	5835-512-Y5U-103Z
	DIODES			
CR1	Diode, MPN3401	1281-0050	Motorola	MPN3401
CR2	Diode, MPN3401	1281-0050	Motorola	MPN3401
CR3	Diode, MPN3401	1281-0050	Motorola	MPN3401
CR4	Diode, MPN3401	1281-0050	Motorola	MPN3401
CR5	Diode, MPN3401	1281-0050	Motorola	MPN3401
CR6	Diode, MPN3401	1281-0050	Motorola	MPN3401
CR7	Diode, MPN3401	1281-0050	Motorola	MPN3401
CR8	Diode, MPN3401	1281-0050	Motorola	MPN3401
CR9	Diode, MPN3401	1281-0050	Motorola	MPN3401
CR10	Diode, MPN3401	1281-0050	Motorola	MPN3401
CR11	Diode, MPN3401	1281-0050	Motorola	MPN3401
CR12	Diode, MPN3401	1281-0050	Motorola	MPN3401
CR13	Diode, MPN3401	1281-0050	Motorola	MPN3401
CR14	Diode, MPN3401	1281-0050	Motorola	MPN3401
	CONNECTORS			
J1	Conn, SMB 50 Ohm Rtang Jk Pc Mt Snap on	2536-0060	Cablewave	700214NP
J2	Conn, SMB 50 Ohm Rtang Jk Pc Mt Snap on	2536-0060	Cablewave	700214NP
J3	Conn, SMB 50 Ohm Rtang Jk Pc Mt Snap on	2536-0060	Cablewave	700214NP
J4	Conn, SMB 50 Ohm Rtang Jk Pc Mt Snap on	2536-0060	Cablewave	700214NP

R. F. SWITCH, 2800 (cont)

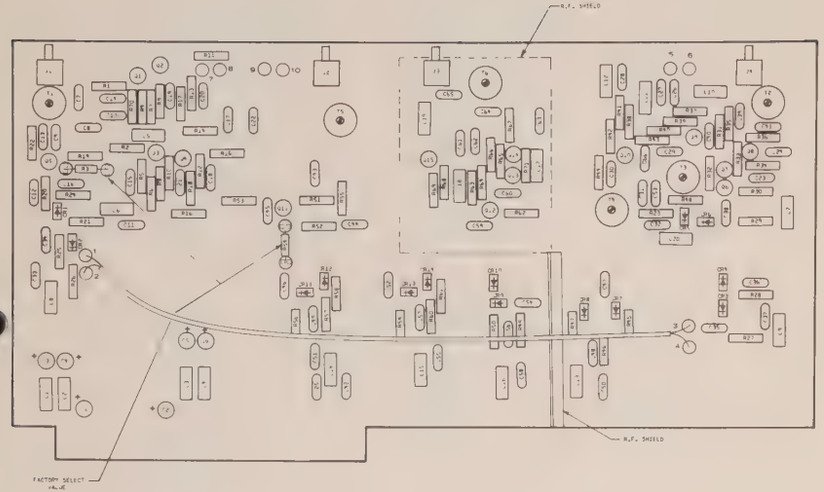
CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
	INDUCTORS			
L1	Choke, 4.7μH, 10%	1585-0021	Delevan	1537-28
L2	Choke, 4.7μH, 10%	1585-0021	Delevan	1537-28
L3	Choke, 4.7μH, 10%	1585-0021	Delevan	1537-28
L4	Choke, 4.7μH, 10%	1585-0021	Delevan	1537-28
L5	Choke, 4.7μH, 10%	1585-0021	Delevan	1537-28
L6	Choke, 4.7μH, 10%	1585-0021	Delevan	1537-28
L7	Choke, 4.7μH, 10%	1585-0021	Delevan	1537-28
L8	Choke, 4.7μH, 10%	1585-0021	Delevan	1537-28
L9	Choke, 4.7μH, 10%	1585-0021	Delevan	1537-28
L10	Choke, 4.7μH, 10%	1585-0021	Delevan	1537-28
L11	Choke, 4.7μH, 10%	1585-0021	Delevan	1537-28
L12	Choke, 4.7μH, 10%	1585-0021	Delevan	1537-28
L13	Choke, 4.7μH, 10%	1585-0021	Delevan	1537-28
L14	Choke, 4.7μH, 10%	1585-0021	Delevan	1537-28
L15	Choke, 4.7μH, 10%	1585-0021	Delevan	1537-28
L16	Choke, 4.7μH, 10%	1585-0021	Delevan	1537-28
L17	Choke, 4.7μH, 10%	1585-0021	Delevan	1537-28
L18	Choke, 4.7μH, 10%	1585-0021	Delevan	1537-28
L19	Choke, 22μH, 10%	1585-0012	Delevan	1537-44
L20	Choke, 4.7μH, 10%	1585-0021	Delevan	1537-28
	TRANSISTORS			
Q1	Trans, 2N3563	1272-0022	Fairchild	2N3563
Q2	Trans, 2N3563	1272-0022	Fairchild	2N3563
Q3	Trans, 2N3563	1272-0022	Fairchild	2N3563
Q4	Trans, 2N3563	1272-0022	Fairchild	2N3563
Q5	Trans, 2N3563	1272-0022	Fairchild	2N3563
Q6	Trans, 2N3563	1272-0022	Fairchild	2N3563
Q7	Trans, 2N3563	1272-0022	Fairchild	2N3563
Q8	Trans, 2N3563	1272-0022	Fairchild	2N3563
Q9	Trans, 2N3563	1272-0022	Fairchild	2N3563
Q10	Trans, 2N3563	1272-0022	Fairchild	2N3563
Q11	Trans, 2N3563	1272-0022	Fairchild	2N3563
Q12	Trans, 2N3563	1272-0022	Fairchild	2N3563
Q13	Trans, 2N3563	1272-0022	Fairchild	2N3563
Q14	Trans, 2N3563	1272-0022	Fairchild	2N3563
Q15	Trans, 2N4275	1272-0016	Fairchild	2N4275
	RESISTORS			
R1	Res, 150 Ohm, 5%, 1/4W Comp	1066-1515	Allen-Bradley	CB1515
R2	Res, 150 Ohm, 5%, 1/4W Comp	1066-1515	Allen-Bradley	CB1515
R3	Res, 22 Ohm, 5%, 1/4W Comp	1066-2205	Allen-Bradley	CB2205
R4	Res, 3.9K, 5%, 1/4W Comp	1066-3925	Allen-Bradley	CB3925
R5	Res, 2.2K, 5%, 1/4W Comp	1066-2225	Allen-Bradley	CB2225
R6	Res, 3.9K, 5%, 1/4W Comp	1066-3925	Allen-Bradley	CB3925
R7	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R8	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R9	Res, 470 Ohm, 5%, 1/4W Comp	1066-4715	Allen-Bradley	CB4715
R10	Res, 470 Ohm, 5%, 1/4W Comp	1066-4715	Allen-Bradley	CB4715

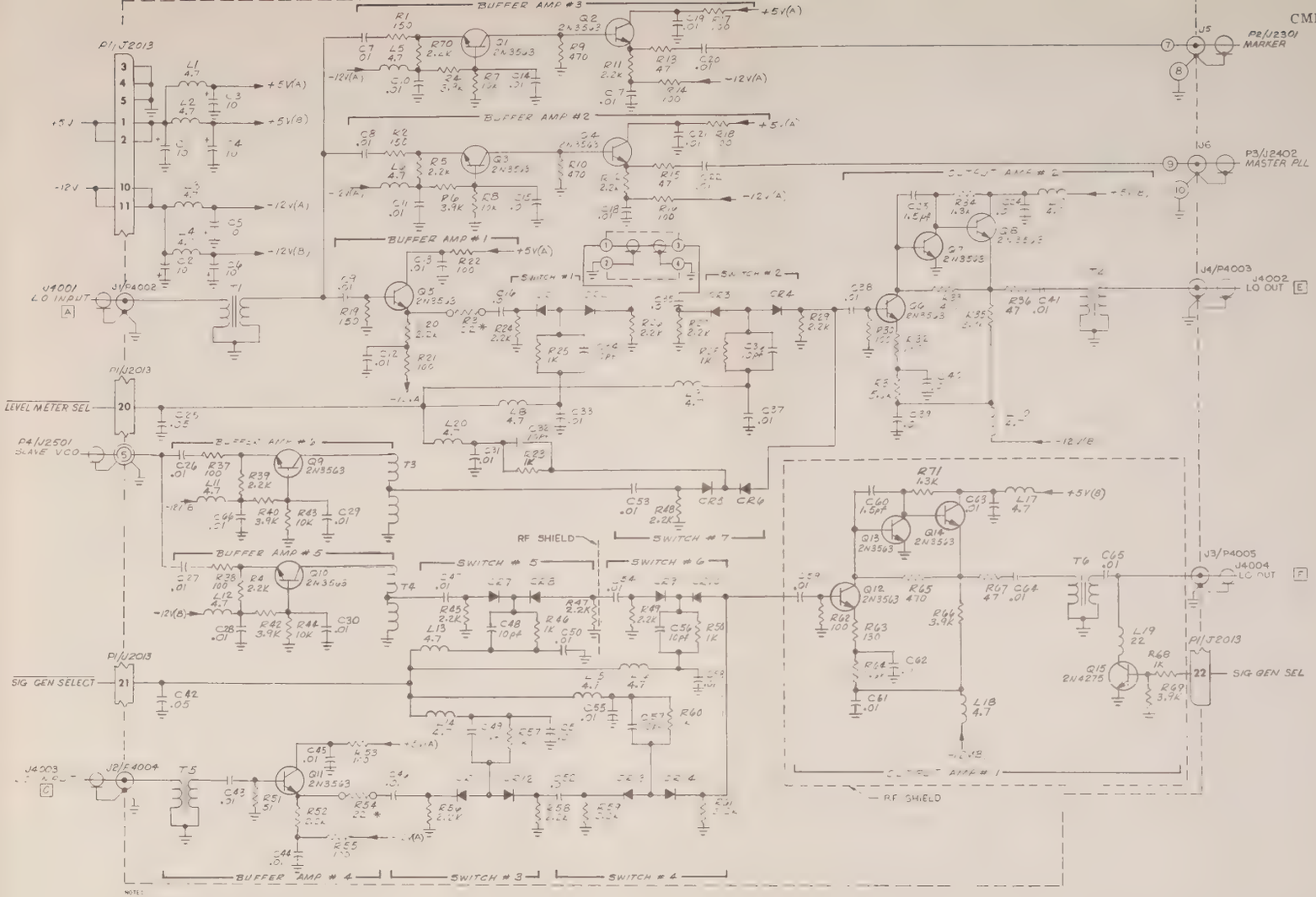
R. F. SWITCH, 2800 (cont)

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R11	Res, 2.2K, 5%, 1/4W Comp	1066-2225	Allen-Bradley	CB2225
R12	Res, 2.2K, 5%, 1/4W Comp	1066-2225	Allen-Bradley	CB2225
R13	Res, 47 Ohm, 5%, 1/4W Comp	1066-4705	Allen-Bradley	CB4705
R14	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R15	Res, 47 Ohm, 5%, 1/4W Comp	1066-4705	Allen-Bradley	CB4705
R16	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R17	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R18	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R19	Res, 150 Ohm, 5%, 1/4W Comp	1066-1515	Allen-Bradley	CB1515
R20	Res, 2.2K, 5%, 1/4W Comp	1066-2225	Allen-Bradley	CB2225
R21	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R22	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R23	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025
R24	Res, 2.2K, 5%, 1/4W Comp	1066-2225	Allen-Bradley	CB2225
R25	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025
R26	Res, 2.2K, 5%, 1/4W Comp	1066-2225	Allen-Bradley	CB2225
R27	Res, 2.2K, 5%, 1/4W Comp	1066-2225	Allen-Bradley	CB2225
R28	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025
R29	Res, 2.2K, 5%, 1/4W Comp	1066-2225	Allen-Bradley	CB2225
R30	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R31	Res, 5.6K, 5%, 1/4W Comp	1066-5625	Allen-Bradley	CB5625
R32	Res, 130 Ohm, 5%, 1/4W Comp	1066-1315	Allen-Bradley	CB1315
R33	Res, 470 Ohm, 5%, 1/4W Comp	1066-4715	Allen-Bradley	CB4715
R34	Res, 1.3K, 5%, 1/4W Comp	1066-1325	Allen-Bradley	CB1325
R35	Res, 3.9K, 5%, 1/4W Comp	1066-3925	Allen-Bradley	CB3925
R36	Res, 47 Ohm, 5%, 1/4W Comp	1066-4705	Allen-Bradley	CB4705
R37	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R38	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R39	Res, 2.2K, 5%, 1/4W Comp	1066-2225	Allen-Bradley	CB2225
R40	Res, 3.9K, 5%, 1/4W Comp	1066-3925	Allen-Bradley	CB3925
R41	Res, 2.2K, 5%, 1/4W Comp	1066-2225	Allen-Bradley	CB2225
R42	Res, 3.9K, 5%, 1/4W Comp	1066-3925	Allen-Bradley	CB3925
R43	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R44	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R45	Res, 2.2K, 5%, 1/4W Comp	1066-2225	Allen-Bradley	CB2225
R46	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025
R47	Res, 2.2K, 5%, 1/4W Comp	1066-2225	Allen-Bradley	CB2225
R48	Res, 2.2K, 5%, 1/4W Comp	1066-2225	Allen-Bradley	CB2225
R49	Res, 2.2K, 5%, 1/4W Comp	1066-2225	Allen-Bradley	CB2225
R50	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025
R51	Res, 51 Ohm, 5%, 1/4W Comp	1066-5105	Allen-Bradley	CB5105
R52	Res, 2.2K, 5%, 1/4W Comp	1066-2225	Allen-Bradley	CB2225
R53	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R54	Res, 22 Ohm, 5%, 1/4W Comp	1066-2205	Allen-Bradley	CB2205
R55	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R56	Res, 2.2K, 5%, 1/4W Comp	1066-2225	Allen-Bradley	CB2225
R57	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025
R58	Res, 2.2K, 5%, 1/4W Comp	1066-2225	Allen-Bradley	CB2225
R59	Res, 2.2K, 5%, 1/4W Comp	1066-2225	Allen-Bradley	CB2225
R60	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025

R. F. SWITCH, 2800 (cont)

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R61	Res, 2.2K, 5%, 1/4W Comp	1066-2225	Allen-Bradley	CB2225
R62	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R63	Res, 130 Ohm, 5%, 1/4W Comp	1066-1315	Allen-Bradley	CB1315
R64	Res, 5.6K, 5%, 1/4W Comp	1066-5625	Allen-Bradley	CB5625
R65	Res, 470 Ohm, 5%, 1/4W Comp	1066-4715	Allen-Bradley	CB4715
R66	Res, 3.9K, 5%, 1/4W Comp	1066-3925	Allen-Bradley	CB3925
R67	Res, 47 Ohm, 5%, 1/4W Comp	1066-4705	Allen-Bradley	CB4705
R68	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025
R69	Res, 3.9K, 5%, 1/4W Comp	1066-3925	Allen-Bradley	CB3925
R70	Res, 2.2K, 5%, 1/4W Comp	1066-2225	Allen-Bradley	CB2225
R71	Res, 1.3K, 5%, 1/4W Comp	1066-1325	Allen-Bradley	CB1325
	TRANSFORMERS			
T1	Assy, Trifilar Coil	1579-0017	Cushman	
T2	Assy, Trifilar Coil	1579-0017	Cushman	
T3	Assy, Trifilar Coil	1579-0017	Cushman	
T4	Assy, Trifilar Coil	1579-0017	Cushman	
T5	Assy, Trifilar Coil	1579-0017	Cushman	
T6	Assy, Trifilar Coil	1579-0017	Cushman	





NOTE:
1. RESISTORS - 1/4W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.
2. CAPACITORS - VALUES IN μF UNLESS OTHERWISE NOTED.
3. INDUCTORS - VALUES IN μH UNLESS OTHERWISE NOTED.
4. *FACTORY SELECT. TYPICAL VALUE SHOWN.
5. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.
6. ALL DIODES ARE MPN 3401 UNLESS OTHERWISE NOTED.

5601**0069

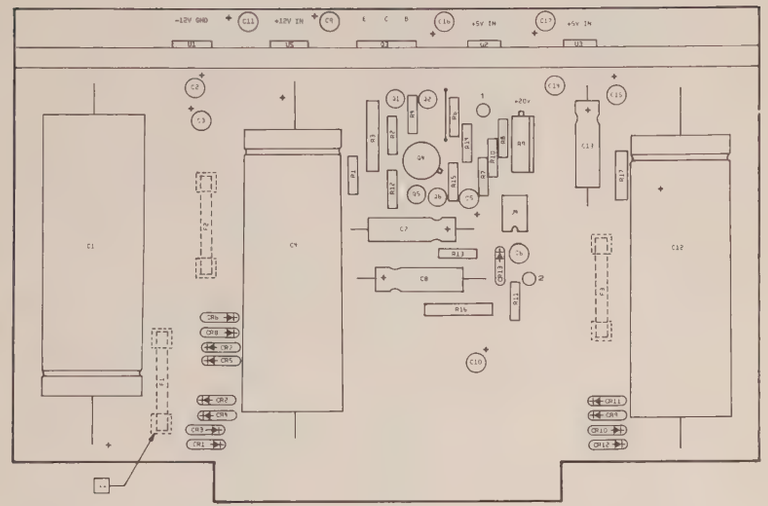
Figure 3-13. R. F. Switch, 2800

LOW VOLTAGE POWER SUPPLY, 2900

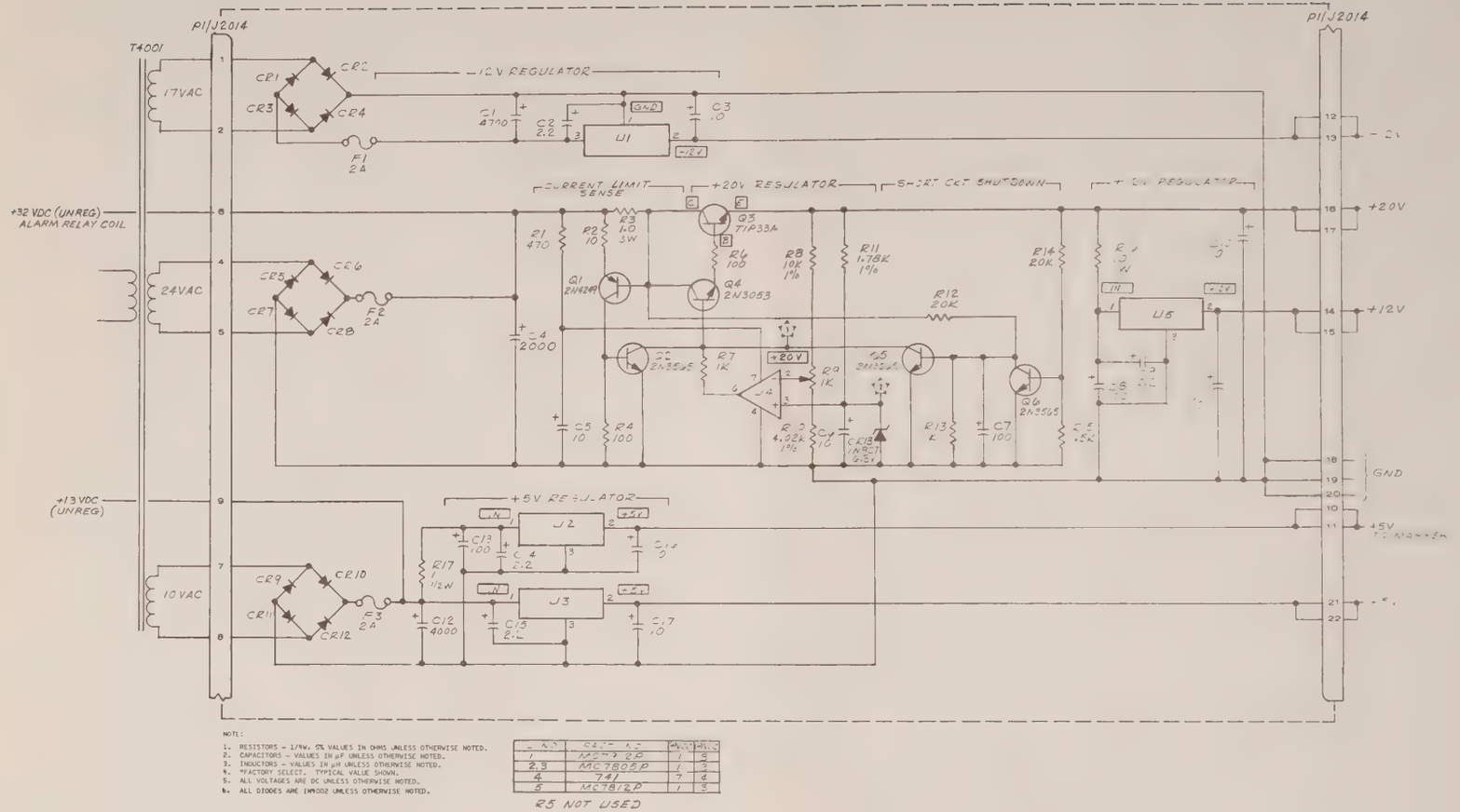
CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
2900	PCB Assy, Low Voltage Power Supply	7001-0424	Cushman	
	PC Board	1780-0575	Cushman	
	CAPACITORS			
C1	Cap, 4700μF, +150-10%, 35V	1014-0018	Ill. Elna	35T4700
C2	Cap, 2.2μF, 10%, 35V	1011-0001	Dickson	D2R2GSB35K
C3	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C4	Cap, 2000μF, +150-10%, 50V	1014-0015	Ill. Elna	50T2000
C5	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C6	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C7	Cap, 100μF, 10%, 25V	1013-0003	Sprague	30D107G025DD5
C8	Cap, 100μF, 10%, 25V	1013-0003	Sprague	30D107G025DD5
C9	Cap, 2.2μF, 10%, 35V	1011-0001	Dickson	D2B2GSB35K
C10	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C11	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C12	Cap, 4000μF, +75-10%, 25V	1014-0005	Sprague	39D408G025JS5
C13	Cap, 100μF, 10%, 25V	1013-0003	Sprague	30D107G025DD5
C14	Cap, 2.2μF, 10%, 35V	1011-0001	Dickson	D2R2GSB35K
C15	Cap, 2.2μF, 10%, 35V	1011-0001	Dickson	D2R2GSB35K
CR16	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
CR17	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
	DIODES			
CR1	Diode, 1N4002	1281-0023	ITT	1N4002
CR2	Diode, 1N4002	1281-0023	ITT	1N4002
CR3	Diode, 1N4002	1281-0023	ITT	1N4002
CR4	Diode, 1N4002	1281-0023	ITT	1N4002
CR5	Diode, 1N4002	1281-0023	ITT	1N4002
CR6	Diode, 1N4002	1281-0023	ITT	1N4002
CR7	Diode, 1N4002	1281-0023	ITT	1N4002
CR8	Diode, 1N4002	1281-0023	ITT	1N4002
CR9	Diode, 1N4002	1281-0023	ITT	1N4002
CR10	Diode, 1N4002	1281-0023	ITT	1N4002
CR11	Diode, 1N4002	1281-0023	ITT	1N4002
CR12	Diode, 1N4002	1281-0023	ITT	1N4002
CR13	Diode, 1N827	1281-0038	Motorola	1N827
	FUSES			
F1	Fuse, 2 Amp Slo Blo	1955-0001	Littelfuse	313002
F2	Fuse, 2 Amp Slo Blo	1955-0001	Littelfuse	313002
F3	Fuse, 2 Amp Slo Blo	1955-0001	Littelfuse	313002
	TRANSISTORS			
Q1	Trans, 2N4249	1272-0024	Fairchild	2N4249
Q2	Trans, 2N3565	1272-0017	Fairchild	2N3565
Q3	Xstr, TIP33A NPN Si	1272-0084	T.I.	TIP33A
Q4	Trans, 2N3053	1272-0011	RCA	2N3053
Q5	Trans, 2N3565	1272-0017	Fairchild	2N3565
Q6	Trans, 2N3565	1272-0017	Fairchild	2N3565

LOW VOLTAGE POWER SUPPLY, 2900 (cont)

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
	RESISTORS			
R1	Res, 470 Ohm, 5%, 1/4W Comp	1066-4715	Allen-Bradley	CB4715
R2	Res, 10 Ohm, 5%, 1/4W Comp	1066-1005	Allen-Bradley	CB1005
R3	Res, 1 Ohm, 5%, 3W WW	1159-0001	Ohmite	4330
R4	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R5	Not Used			
R6	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R7	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025
R8	Res, 10K, 1%, 1/8W MF	1075-0009	Dale	MF 1/8
R9	Pot, 1K, 10%, 3/4W	1215-0013	Helitrim	89WR
R10	Res, 4.02K, 1%, 1/8W MF	1075-0094	Dale	MF 1/8
R11	Res, 1.78K, 1%, 1/8W MF	1075-0089	Dale	MF 1/8
R12	Res, 20K, 5%, 1/4W Comp	1066-2035	Allen-Bradley	CB2035
R13	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025
R14	Res, 20K, 5%, 1/4W Comp	1066-2035	Allen-Bradley	CB2035
R15	Res, 1.5K, 5%, 1/4W Comp	1066-1525	Allen-Bradley	CB1525
R16	Res, 10 Ohm, 5%, 1W Comp	1068-1005	Allen-Bradley	GB1005
R17	Res, 1 Ohm, 5%, 1/2W Comp	1067-0001	Allen-Bradley	EB0001
	INTEGRATED CIRCUITS			
U1	IC, MC7912CP, 12V Neg Rgltr	2025-0092	Motorola	MC7912CP
U2	IC, MC7805CP, 5V Pos Rgltr	2025-0088	Motorola	MC7805CP
U3	IC, MC7805CP, 5V Pos Rgltr	2025-0088	Motorola	MC7805CP
U4	IC, SN72741P	2025-0067	T.I.	SN72741P
U5	IC, MC7812CP, 12V Pos Rgltr	2025-0100	Motorola	MC7812CP



NOTE: F1 FUSES LOCATED ON FARSIDE.



NOTE:
1. RESISTORS - 1/4W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.
2. CAPACITORS - VALUES IN μF UNLESS OTHERWISE NOTED.
3. INDUCTORS - VALUES IN μH UNLESS OTHERWISE NOTED.
4. *FACTORY SELECT. TYPICAL VALUE SHOWN.
5. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.
6. ALL DIODES ARE IN4002 UNLESS OTHERWISE NOTED.

1	MC7912P	1	3
2,3	MC7805P	1	3
4	741	7	4
5	MC7812P	1	3

25 NOT USED

Figure 3-14. Low Voltage Power Supply, 2900

HIGH VOLTAGE POWER SUPPLY/DEFLECTION AMPLIFIER, 3000

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
3000	PCB Assy, Hi Voltage P. S. /Defl Amp	7001-0427	Cushman	
	PC Board	1780-0578	Cushman	
	CAPACITORS			
C1	Cap, 1500PF, 5%, 500V Mica	1002-0083	Elmenco	DM19-E-152J
C2	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C3	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C4	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C5	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C6	Cap, .01μF, 20%, 3KV Disc	1005-0069	Sprague	30GA-S/10
C7	Cap, .01μF, 20%, 3KV Disc	1005-0069	Sprague	30GA-S/10
C8	Cap, .01μF, 20%, 3KV Disc	1005-0069	Sprague	30GA-S/10
C9	Cap, .01μF, 20%, 3KV Disc	1005-0069	Sprague	30GA-S/10
C10	Cap, .01μF, 20%, 3KV Disc	1005-0069	Sprague	30GA-S/10
C11	Cap, .01μF, 20%, 3KV Disc	1005-0069	Sprague	30GA-S/10
C12	Cap, 50μF, 50V	1013-0007	Sprague	30D506G050DD5
C13	Cap, 2000μF, +150-10%, 50V	1014-0015	Sprague	TVA1318.2
C14	Cap, 1μF, +150-10%, 450V	1014-0011	Ill. Elna	450T1
C15	Cap, 10μF, +75-10%, 150V	1013-0017	Sprague	30D106G150DD5
C16	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C17	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C18	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C19	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C20	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C21	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C22	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C23	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C24	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C25	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C26	Cap, 10μF, +50-20%, 35V	1011-0006	ITT	TAG 10/35-20
C27	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C28	Cap, 330PF, 5%, 500V Mica	1002-0032	Elmenco	DM15-F-331J
C29	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C30	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C31	Cap, 1μF, +150-10%, 450V	1014-0011	Ill. Elna	450T1
C32	Cap, .05μF, +80-20%, 25V Disc	1005-0014	Erie	5855-505-Y5U0-503Z
C33	Cap, .1μF, 10%, 100V	1008-0031	Sprague	225P10491WA3
C34	Cap, .047μF, 10%, 100V	1008-0049	Sprague	225P47391WA3
C35	Cap, .01μF , 10%, 200V	1008-0043	Sprague	225P10392XA3
C36	Cap, .01μF, 20%, 3KV Disc	1005-0069	Sprague	30GA-S/10
	DIODES			
CR1	Dio, VG4X Si Hv Fast Rcvy 4000 PIV 25A	1282-0015	Varo	VG4X
CR2	Dio, VG4X Si Hv Fast Rcvy 4000 PIV 25A	1282-0015	Varo	VG4X
CR3	Dio, VG4X Si Hv Fast Rcvy 4000 PIV 25A	1282-0015	Varo	VG4X
CR4	Dio, VG4X Si Hv Fast Rcvy 4000 PIV 25A	1282-0015	Varo	VG4X
CR5	Dio, VG4X Si Hv Fast Rcvy 4000 PIV 25A	1282-0015	Varo	VG4X

HIGH VOLTAGE POWER SUPPLY/DEFLECTION AMPLIFIER, 3000 (cont)

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
CR6	Dio, VG4X Si Hv Fst Rcvy 4000 PIV 25A	1282-0015	Varo	VG4X
CR7	Diode, 1N5062	1281-0030	G. E.	1N5062
CR8	Diode, 1N4752A	1281-0047	Motorola	1N4752A
CR9	Diode, 1N827	1281-0038	Motorola	1N827
CR10	Diode, 1N5062	1281-0030	G. E.	1N5062
CR11	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR12	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR13	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR14	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR15	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR16	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR17	Diode, 1N3064	1281-0013	Teledyne	1N3064
CR18	Diode, 1N3064	1281-0013	Teledyne	1N3064
	FUSE			
F1	Fuse, 2 Amp Slo Blo	1955-0001	Littelfuse	313002
	CONNECTORS			
J1	Conn, 3 Pin Recptcl Mini Housing	2535-0044	Molex	09-65-1031
P3	Conn, 3 Pin Plug Mini	2535-0045	Molex	09-50-3031
	INDUCTORS			
L1	Choke, 1000μH, 5%	1585-0020	Delevan	2500-28
L2	Choke, 1000μH, 5%	1585-0020	Delevan	2500-28
L3	Choke, 1000μH, 5%	1585-0020	Delevan	2500-28
L4	Choke, 1000μH, 5%	1585-0020	Delevan	2500-28
	TRANSISTORS			
Q1	Trans, 2N4275	1272-0016	Fairchild	2N4275
Q2	Trans, D44C8	1272-0056	G. E.	D44C8
Q3	Trans, 2N4275	1272-0016	Fairchild	2N4275
Q4	Trans, 2N4275	1272-0016	Fairchild	2N4275
Q5	Trans, 2N4275	1272-0016	Fairchild	2N4275
Q6	Trans, D44C8	1272-0056	G. E.	D44C8
Q7	Trans, 2N4275	1272-0016	Fairchild	2N4275
Q8	Trans, 2N3567	1272-0014	Fairchild	2N3567
Q9	Trans, MJE340	1272-0046	Motorola	MJE340
Q10	Trans, 2N4249	1272-0024	Fairchild	2N4249
Q11	Trans, MJE340	1272-0046	Motorola	MJE340
Q12	Trans, MJE340	1272-0046	Motorola	MJE340
Q13	Trans, 2N3565	1272-0017	Fairchild	2N3565
Q14	Trans, MJE340	1272-0046	Motorola	MJE340
Q15	Trans, 2N4249	1272-0024	Fairchild	2N4249
Q16	Trans, 2N4393	1272-0055	Teledyne	2N4393
Q17	Trans, 2N3565	1272-0017	Fairchild	2N3565
Q18	Trans, 2N4393	1272-0055	Teledyne	2N4393
Q19	Trans, 2N4275	1272-0016	Fairchild	2N4275
Q20	Trans, 2N4249	1272-0024	Fairchild	2N4249

HIGH VOLTAGE POWER SUPPLY/DEFLECTION AMPLIFIER, 3000 (cont)

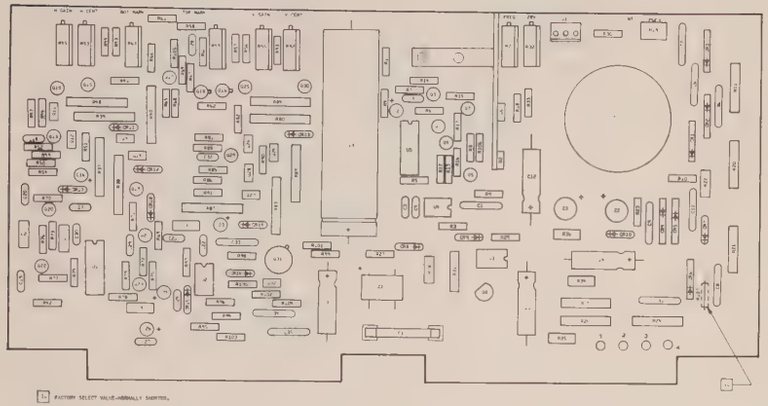
CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
Q21	Trans, 2N4249	1272-0024	Fairchild	2N4249
Q22	Trans, 2N4275	1272-0016	Fairchild	2N4275
Q23	Trans, 2N4275	1272-0016	Fairchild	2N4275
Q24	Trans, MJE340	1272-0046	Motorola	MJE340
Q25	Trans, 2N4249	1272-0024	Fairchild	2N4249
Q26	Trans, MJE340	1272-0046	Motorola	MJE340
Q27	Trans, MJE340	1272-0046	Motorola	MJE340
Q28	Trans, MJE340	1272-0046	Motorola	MJE340
Q29	Trans, 2N3565	1272-0017	Fairchild	2N3565
Q30	Trans, 2N4249	1272-0024	Fairchild	2N4249
Q31	Trans, 2N5415	1272-0051	RCA	2N5415
Q32	Trans, MJE340	1272-0046	Motorola	MJE340
Q33	Trans, TIP33A, NPN Si	1272-0084	T.I.	TIP33A
	RESISTORS			
R1	Res, 20K, 1%, 1/8W MF	1075-0096	Dale	MF 1/8
R2	Pot, 10K, 10%, 3/4W	1215-0014	Helitrim	89WR
R3	Res, 2.74K, 1%, 1/8W MF	1075-0071	Dale	MF 1/8
R4	Res, 10 Ohm, 5%, 1/4W Comp	1066-1005	Allen-Bradley	CB1005
R5	Res, 2.7K, 5%, 1/4W Comp	1066-2725	Allen-Bradley	CB2725
R6	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025
R7	Res, 10 Ohm, 5%, 1/4W Comp	1066-1005	Allen-Bradley	CB1005
R8	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R9	Res, 150 Ohm, 5%, 1/4W Comp	1066-1515	Allen-Bradley	CB1515
R10	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R11	Res, 5.6M, 5%, 1W Comp	1068-5655	Allen-Bradley	GB5655
R12	Res, 2.7K, 5%, 1/4W Comp	1066-2755	Allen-Bradley	CB2725
R13	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025
R14	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025
R15	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R16	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025
R17	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025
R18	Res, 150 Ohm, 5%, 1/4W Comp	1066-1515	Allen-Bradley	CB1515
R19	Pot, 1M, 20%, 1W Vert Trim	1200-0026	CTS	360S105B
R20	Res, 5.6M, 5%, 1W Comp	1068-5655	Allen-Bradley	GB5655
R21	Res, 5.6M, 5%, 1W Comp	1068-5655	Allen-Bradley	GB5655
R22	Res, 2.2K, 5%, 1/2W Comp	1067-2225	Allen-Bradley	EB2225
R23	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R24	Res, 3.6M, 5%, 1W Comp	1068-3655	Allen-Bradley	GB3655
R25	Res, 2.2M, 5%, 1W Comp	1068-2255	Allen-Bradley	GB2255
R26	Res, 2.2M, 5%, 1W Comp	1068-2255	Allen-Bradley	GB2255
R27	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R28	Res, 470 Ohm, 5%, 1/2W Comp	1067-4715	Allen-Bradley	EB4715
R29	Res, 3K, 5%, 1/4W Comp	1066-3025	Allen-Bradley	CB3025
R30	Res, 10K, 1%, 1/8W MF	1075-0009	Dale	MF 1/8
R31	Res, 1 Ohm, 5%, 3W WW	1159-0001	Ohmite	4330
R32	Pot, 1K, 10%, 3/4W	1215-0013	Helitrim	89WR
R33	Res, 2.49K, 1%, 1/8W MF	1075-0027	Dale	MF 1/8
R34	Res, 10 Ohm, 5%, 1/2W Comp	1067-1005	Allen-Bradley	EB1005
R35	Res, 100K, 5%, 1/2W Comp	1067-1045	Allen-Bradley	EB1045

HIGH VOLTAGE POWER SUPPLY/DEFLECTION AMPLIFIER, 3000 (cont)

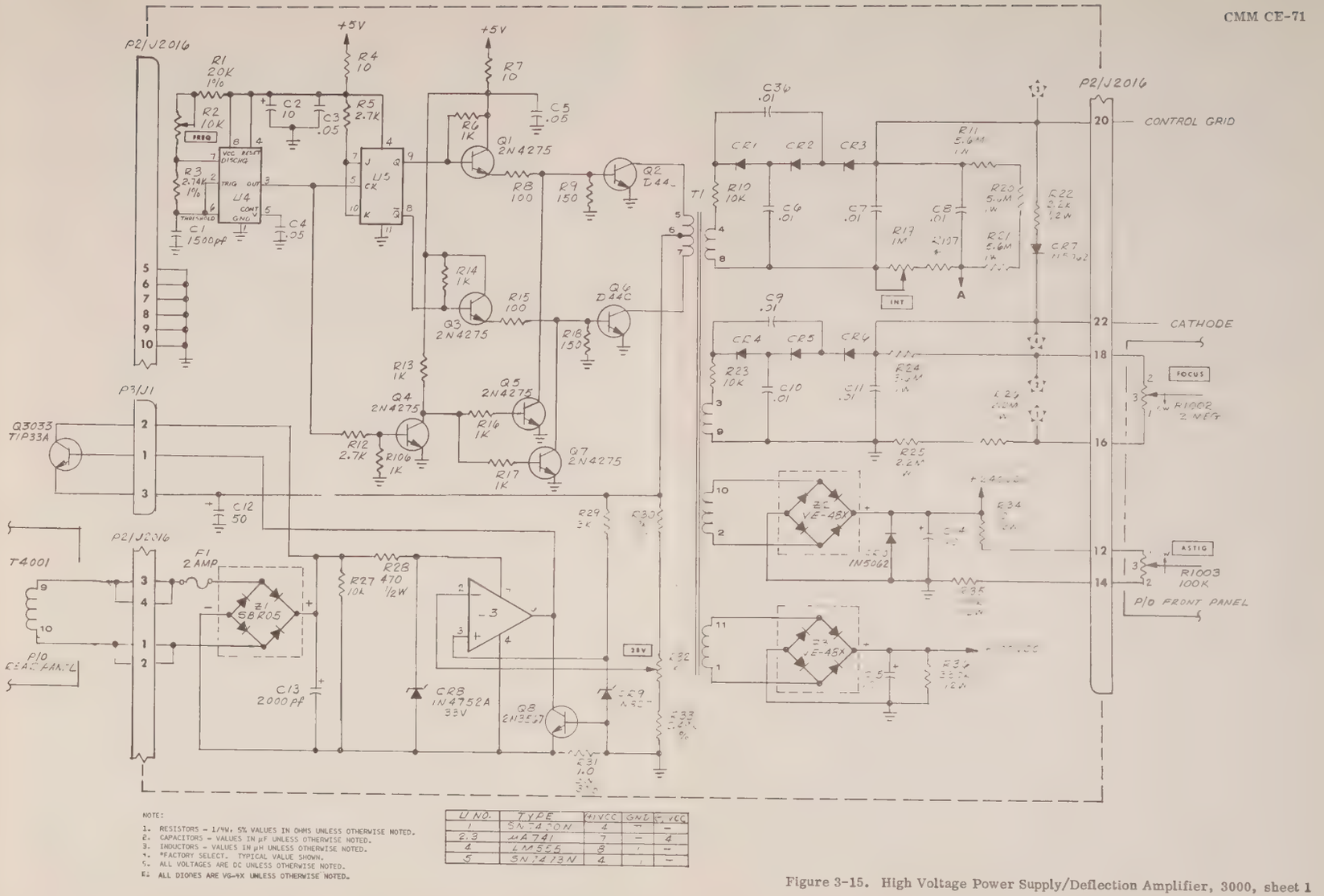
CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R36	Res, 330K, 5%, 1/2W Comp	1067-3345	Allen-Bradley	EB3345
R37	Res, 100K, 1%, 1/2W MF	1076-0009	Dale	MF 1/2
R38	Res, 100K, 1%, 1/2W MF	1076-0009	Dale	MF 1/2
R39	Res, 221K, 1%, 1/2W MF	1076-0016	Dale	MF 1/2
R40	Res, 196K, 1%, 1/2W MF	1076-0015	Dale	MF 1/2
R41	Res, 470K, 5%, 1/4W Comp	1066-4745	Allen-Bradley	CB4745
R42	Res, 1.5K, 5%, 1/4W Comp	1066-1525	Allen-Bradley	CB1525
R43	Res, 3.48K, 1%, 1/8W MF	1075-0093	Dale	MF 1/8
R44	Res, 2K, 1%, 1/8W MF	1075-0103	Dale	MF 1/8
R45	Pot, 10K, 10%, 3/4W	1215-0014	Helitrim	89WR
R46	Res, 332 Ohm, PPM Metal Film	1075-0024	Dale	MF 1/8
R47	Res, 11.3K, 1%, 1/8W MF	1075-0034	Dale	MF 1/8
R48	Res, 5.62K, 1%, 1/2W MF	1076-0014	Dale	MF 1/2
R49	Res, 8.2K, 5%, 1/4W Comp	1066-8225	Allen-Bradley	CB8225
R50	Res, 3.9K, 5%, 1/4W Comp	1066-3925	Allen-Bradley	CB3925
R51	Res, 332 Ohm, PPM Metal Film	1075-0024	Dale	MF 1/8
R52	Res, 1.5K, 5%, 1/4W Comp	1066-1525	Allen-Bradley	CB1525
R53	Pot, 10K, 10%, 3/4W	1215-0014	Helitrim	89WR
R54	Res, 11.3K, 1%, 1/8W MF	1075-0034	Dale	MF 1/8
R55	Pot, 10K, 10%, 3/4W	1215-0014	Helitrim	89WR
R56	Res, 3.48K, 1%, 1/8W MF	1075-0093	Dale	MF 1/8
R57	Res, 2.61K, 1%, 1/8W MF	1075-0090	Dale	MF 1/8
R58	Res, 430 Ohm, 5%, 1/4W Comp	1066-4315	Allen-Bradley	CB4315
R59	Pot, 500 Ohm, 10%, 3/4W	1215-0011	Helitrim	89WR
R60	Res, 620 Ohm, 5%, 1/4W Comp	1066-6215	Allen-Bradley	CB6215
R61	Res, 820 Ohm, 5%, 1/4W Comp	1066-8215	Allen-Bradley	CB8215
R62	Res, 100K, 5%, 1/4W Carbon Comp	1066-1045	Allen-Bradley	CB1045
R63	Pot, 100 Ohm, 10%, 3/4W	1215-0010	Helitrim	89WR
R64	Res, 13K, 5%, 1/4W Comp	1066-1335	Allen-Bradley	CB1335
R65	Res, 100K, 5%, 1/4W Carbon Comp	1066-1045	Allen-Bradley	CB1045
R66	Res, 100 Ohm, 5%, 1/4W Comp	1066-1015	Allen-Bradley	CB1015
R67	Res, 100K, 5%, 1/4W Carbon Comp	1066-1045	Allen-Bradley	CB1045
R68	Res, 12K, 5%, 1/4W Comp	1066-1235	Allen-Bradley	CB1235
R69	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R70	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R71	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R72	Res, 27K, 5%, 1/4W Comp	1066-2735	Allen-Bradley	CB2735
R73	Res, 27K, 5%, 1/4W Comp	1066-2735	Allen-Bradley	CB2735
R74	Res, 510 Ohm, 5%, 1/4W Comp	1066-5115	Allen-Bradley	CB5115
R75	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R76	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R77	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R78	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R79	Res, 510 Ohm, 5%, 1/4W Comp	1066-5115	Allen-Bradley	CB5115
R80	Res, 221K, 1%, 1/2W MF	1076-0016	Dale	MF 1/2
R81	Res, 11.3K, 1%, 1/8W MF	1075-0034	Dale	MF 1/8
R82	Res, 332 Ohm, PPM Metal Film	1075-0024	Dale	MF 1/8
R83	Res, 100K, 1%, 1/2W MF	1076-0009	Dale	MF 1/2
R84	Res, 5.62K, 1%, 1/2W MF	1076-0014	Dale	MF 1/2
R85	Res, 8.2K, 5%, 1/4W Comp	1066-8225	Allen-Bradley	CB8225

HIGH VOLTAGE POWER SUPPLY/DEFLECTION AMPLIFIER, 3000 (cont)

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
R86	Res, 3.9K, 5%, 1/4W Comp	1066-3925	Allen-Bradley	CB3925
R87	Res, 100K, 1%, 1/2W MF	1076-0009	Dale	MF 1/2
R88	Res, 1.5K, 5%, 1/4W Comp	1066-1525	Allen-Bradley	CB1525
R89	Res, 196K, 1%, 1/2W MF	1076-0015	Dale	MF 1/2
R90	Res, 332 Ohm, PPM Metal Film	1075-0024	Dale	MF 1/8
R91	Res, 11.3K, 1%, 1/8W MF	1075-0034	Dale	MF 1/8
R92	Pot, 10K, 10%, 3/4W	1215-0014	Helitrim	89WR
R93	Res, 5.6K, 5%, 1/4W Comp	1066-5625	Allen-Bradley	CB5625
R94	Res, 4.3K, 5%, 1/4W Comp	1066-4325	Allen-Bradley	CB4325
R95	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025
R96	Res, 100K, 5%, 1/4W Carbon Comp	1066-1045	Allen-Bradley	CB1045
R97	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R98	Res, 91K, 5%, 1/4W Comp	1066-9135	Allen-Bradley	CB9135
R99	Res, 10K, 5%, 1/4W Comp	1066-1035	Allen-Bradley	CB1035
R100	Res, 3.6K, 5%, 1/4W Comp	1066-3625	Allen-Bradley	CB3625
R101	Res, 2.2K, 5%, 1/4W Comp	1066-2225	Allen-Bradley	CB2225
R102	Res, 270 Ohm, 5%, 1/4W Comp	1066-2715	Allen-Bradley	CB2715
R103	Res, 3.3K, 5%, 1/4W Comp	1066-3325	Allen-Bradley	CB3325
R104	Res, 470 Ohm, 5%, 1/4W Comp	1066-4715	Allen-Bradley	CB4715
R105	Res, 3K, 5%, 1/4W Comp	1066-3025	Allen-Bradley	CB3025
R106	Res, 1K, 5%, 1/4W Comp	1066-1025	Allen-Bradley	CB1025
R107	Res, FSV, 5%, 1/2W CC	1066-XXXX	Allen-Bradley	CBXXXX
	TRANSFORMER			
T1	Transf, High Voltage	1575-0016	Cushman	
	INTEGRATED CIRCUITS			
U1	IC, SN7400N, TTL Nand Gate	2025-0003	T.I.	SN7400N
U2	IC, SN72741P	2025-0067	T.I.	SN72741P
U3	IC, SN72741P	2025-0067	T.I.	SN72741P
U4	IC, MC1455P1, Timing Circuit	2025-0091	Motorola	MC1455P1
U5	IC, SN7473N, Dual JK Flip Flop	2025-0055	T.I.	SN7473N
	DIODE BRIDGE			
Z1	Diode Bridge, SBR05	1281-5001	Semtech	SBR05



[1] FACTORY SELECT VALUE-NORMALLY SHORTED.



NOTE:

1. RESISTORS – 1/4W, 5% VALUES IN OHMS UNLESS OTHERWISE NOTED.
2. CAPACITORS – VALUES IN μF UNLESS OTHERWISE NOTED.
3. INDUCTORS – VALUES IN μH UNLESS OTHERWISE NOTED.
4. *FACTORY SELECT. TYPICAL VALUE SHOWN.
5. ALL VOLTAGES ARE DC UNLESS OTHERWISE NOTED.
6. ALL DIODES ARE VG-4X UNLESS OTHERWISE NOTED.

U NO.	TYPE	+VCC	GND	-VCC
1	SN74LS00N	4	—	—
2,3	μA741	7	—	4
4	LM555	8	1	—
5	SN7413N	4	7	—

Figure 3-15. High Voltage Power Supply/Deflection Amplifier, 3000, sheet 1

5601**0069

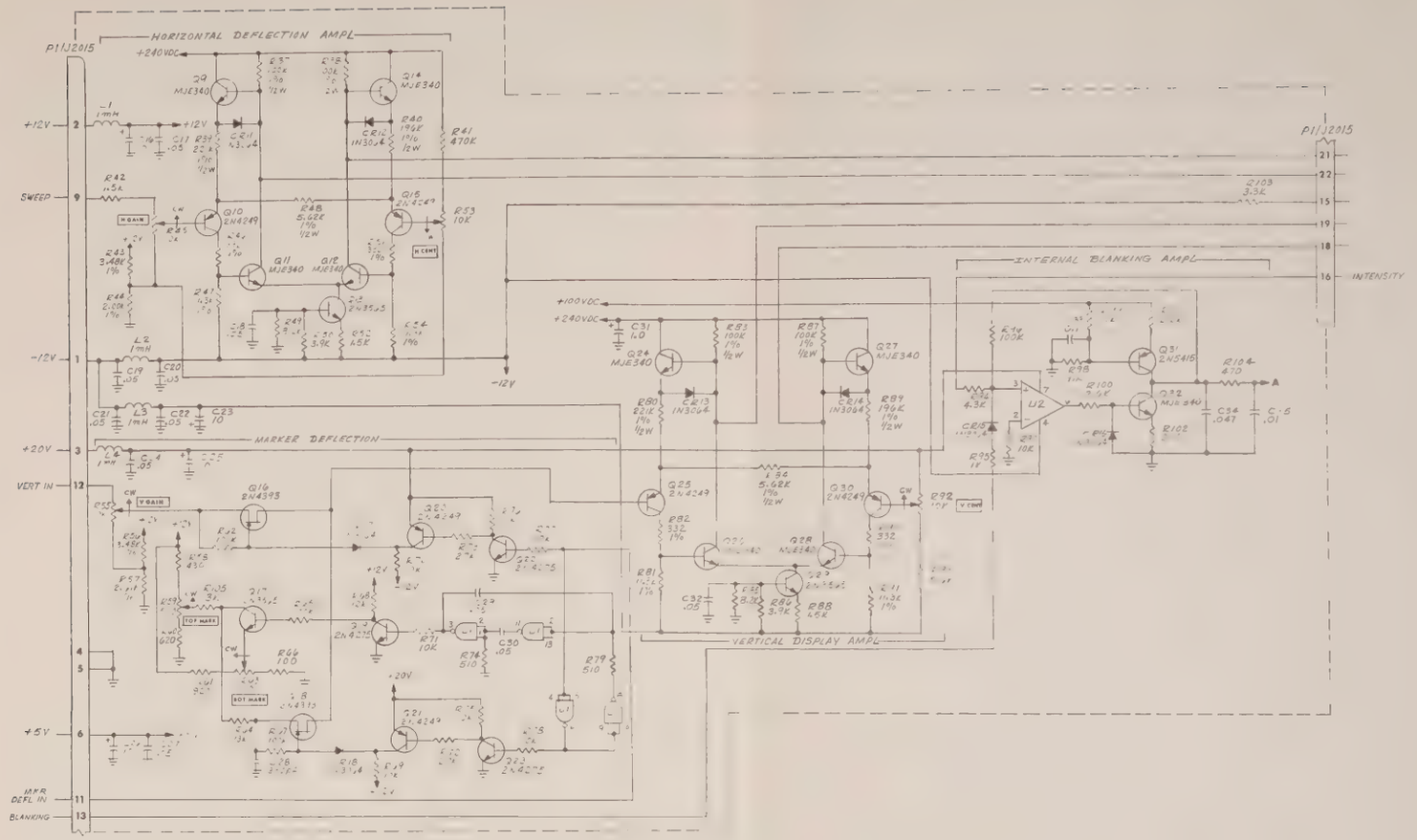


Figure 3-16. High Voltage Power Supply/Deflection Amplifier, 3000, sheet 2

REAR PANEL, 4000

CKT. REF.	DESCRIPTION	CE STOCK NO.	MFR.	MFR. NO.
4000	PNL Assy, Rear	7003-0117	Cushman	
	FUSE			
F1	Fuse, 1 1/2 Amp 3AG S/B	1955-0018	Bussman	AGC 1-1/2 S/B
	CONNECTORS			
J1	Conn, RG188 BNC BHD Jk/Rtang SMB 4.75"	7032-4812	Cushman	
J2	Conn, RG188 BNC BHD Jk/Rtang SMB 10.0"	7032-4833	Cushman	
J3	Conn, RG188 BNC BHD Jk/Rtang SMB 7.07"	7032-4821	Cushman	
J4	Conn, RG188 BNC BHD Jk/Rtang SMB 7.5"	7032-4823	Cushman	
J5	Conn, RG188 BNC BHD Jk/Pgtl SMB 15.5"	7032-5044	Cushman	
J6	Post, Binding Red Insulated Head	2595-0003	Superior	DF21RC
J7	Post, Binding Red Insulated Head	2595-0003	Superior	DF21RC
	POWER CORD			
P1	Cord, Power 8 Ft. Gray Pl One End	3170-0012	Cushman	
	SWITCH			
S1	Switch, Slide 115/230V	1850-0012	Switchcraft	46256LFR
	TRANSFORMER			
T1	Transf, Power	1575-0021	Cushman	
	HOLDER			
XF1	Holder, Fuse Blk Knrl Pnl Mt	1965-0015	Littelfuse	342-001AL

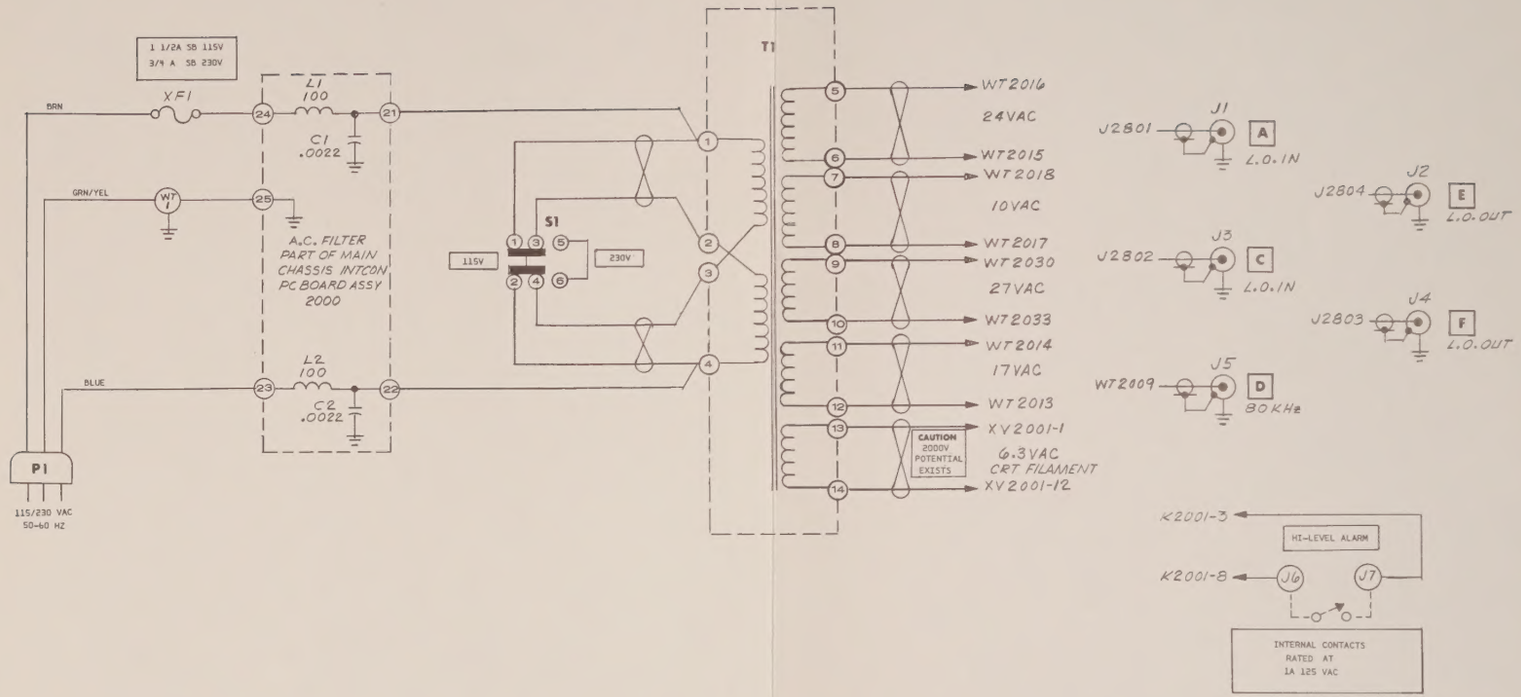


Figure 3-17. Rear Panel Interconnection Diagram, 4000

MP MASTER
MA31808